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IMPERIAL BUREAU 29 APR 1938 INSTITUTE

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* (Annual Subscription 21/-, With Supplement 25/-.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

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MALARIA.

JAMES (S. P.). **Advances in Knowledge of Malaria since the War.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. Nov. 30. Vol. 31. No. 3. pp. 263–278 With 2 maps, 1 plate & 1 graph.

This is the presidential address delivered before the Royal Society of Tropical Medicine and Hygiene. The account it gives of malariological progress during the past twenty years is both interesting and encouraging. The author having contributed so much to that progress, and having been so intimately connected with all the work he describes, the reader obtains inside information, as it were, of developments that enable the public health worker of to-day to look forward to the eventual control of malaria more hopefully than seemed possible at the close of the war.

An account is given of the formation and of the work of the Malaria Commission of the League of Nations and of the great service it has rendered in bringing prominent malariologists of different countries in contact with each other. A tribute is likewise paid to the activities of the International Health Division of the Rockefeller Foundation in the field of malaria research and prevention. Reference is made to the opportunities for malaria research that were opened up by malaria-therapy and to the advantages that were taken of such opportunities. The achievements of chemotherapeutic research into malarial remedies during recent years are referred to.

The second part of the paper deals with discoveries and additions to knowledge that have made the post-war years noteworthy. Studies of the behaviour of the adult female mosquito in houses were the starting point which led to the discovery of biological races of Anopheles indistinguishable morphologically in the adult stage, but with different rôles in the epidemiology of malaria. The recognition that the different species of the malaria parasite contain numerous strains having different biological properties was of great importance. On the chemical side the discovery of plasmoquine and other synthetic products is an outstanding chapter in malaria research. The study of avian malaria has been most fruitful; the discovery that some avian plasmodia have two schizogonic cycles of development in their vertebrate hosts, one of which is in the reticulo-endothelial cells of internal organs, is of special interest. The study of malaria in monkeys has also been productive of notable additions to knowledge.

The last part of the paper deals with recent developments in connexion with anti-malaria measures, their application and organization. A graph illustrates the fall in the incidence of malaria among British troops in India during the period under review.

From the nature of this interesting address a résumé can be but an incomplete list of contents. *Norman White.*

EDGE (P. Granville). **The Incidence and Distribution of Malaria in British Colonial Possessions.**—*Supplement to Trop. Dis. Bull.* 1937. Nov. pp. 3*–12*.

The author has brought together all the information obtainable in British Colonial Medical Reports about malaria prevalence in 1935. The combined population of British colonial territories, nine-tenths of which are wholly within the Tropics, approximates 61 million. More than six and a-quarter million cases of malaria were treated at Government medical centres. This is about one-quarter of the total number of patients treated for all causes of sickness. Such figures give but scant information as to the extent of the ravages attributable to malaria. In many colonies, except in the main centres of population, comparatively little is known of the malaria situation. The number of cases treated was proportionally far greater in the colonies in the Far East than elsewhere. In large measure this was due to the Ceylon epidemic ; malaria caused 47,000 deaths in Ceylon in 1935 as compared with 2,333 in the previous year. Ninety-five per cent. of the cases recorded in Far East Colonies were reported from Ceylon. The only colonies from which no case of malaria was reported were :—Barbados, the Bahamas, the Bermudas, Gibraltar, Basutoland, (where no anophelines have been found), Seychelles, Rodrigues Island (Mauritius), Fiji, and the Gilbert and Ellice Islands.

It is obviously quite impossible to give an adequate résumé of a paper such as this : it is itself but a résumé. The main fact that emerges from an interesting study is that our knowledge regarding the prevalence of malaria in the British Colonies, and almost everywhere else, as a matter of fact, is appallingly limited. *N. W.*

MARNEFFE. La prophylaxie du paludisme dans les troupes en campagne. (Conférence faite aux officiers de réserve du Corps de Santé, le 28 avril 1937, à Hanoi.) [**Lecture for Military Medical Officers on the Prevention of Malaria among Troops on Service.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. June–July. Vol. 15. No. 6. pp. 590–611. With 1 chart. [11 refs.]

This lecture refers to the heavy toll that malaria has exacted from troops engaged in military operations in French Indo-China in the past, and gives a good account of the measures that should be taken to preserve the health and efficiency of such troops. Examples are given of the success attendant upon measures to control malaria among garrisons of posts in regions where malaria is hyperendemic. The value of quinine and of the synthetic drugs in the prophylaxis of malaria in such circumstances as these is adequately described. [The author ascribes to Patrick MANSON the discovery of the rôle played by mosquitoes in the spread of malaria.] *N. W.*

CYPRUS: ANNUAL MEDICAL & SANITARY REPORT 1936 [NEFF (E. A.), Director of Med. Services]. Appendix E. pp. 44–54. With 1 chart.—**Extract of the Report on the Work of the International Health Division of the Rockefeller Foundation in Cyprus, 1936** [STRATMAN-THOMAS (W. K.), BARBER (M. A.) & CARTER (J. C.)].

In 1936 one-quarter of the villages of Cyprus were surveyed. The spleen index of 10,367 children from 1 to 15 years of age was 22·8 per cent. The parasite index of 8,127 children was 27·4 per cent. There had been a relatively high malaria incidence during the summer of the previous year. *Vivax* infections predominated, as was to be expected in a spring survey. Infections with *vivax, falciparum* and *quartana* have all been found at altitudes above 4,000 ft. The spleen and parasite indexes are highest at altitudes of from 1,000 to 1,500 ft. The two rates follow each other closely at all altitudes up to 2,000 ft. Above this the parasite rate was considerably higher than the spleen rate.

A. superpictus and *A. elutus* are the two chief vectors in Cyprus. *A. bifurcatus* and *A. hyrcanus* are both common in winter and in early spring. They are probably of little importance in the transmission of malaria. Infected specimens of *A. bifurcatus* have been found: in places in the Famagusta District where it is the only anopheline found the malaria incidence is low. More than four-fifths of the Island's malaria is due to *A. superpictus*. It breeds in mountain streams all over the island; it is not confined to high elevations, however, being found in rivers traversing the level plain. Adults have been found above 4,000 ft. Despite the lack of rainfall during the hottest months malaria transmission is at its height. The mountain streams are reduced to mere trickles of water but the small pools on the margins of these trickles offer ideal conditions for the breeding of *superpictus*. *A. elutus* breeds in marshes and its distribution in the Island is spotty. The extensive marshes near the shore in which it breeds extensively can be dealt with. The control of *A. superpictus* is a problem of much greater difficulty. Abundant production of both *elutus* and *superpictus* occurs quite early in the spring; there is no lag in the production of *superpictus* such as occurs in Greece. The sporozoite rates are highest from June to September. Infected *superpictus* have been found in March; these infections have probably survived in overwintering females. Infections of both species occur in May and June. A study of infants showed that the bulk of infections take place in the four months June to September; that autumn transmission does occur but to a much less degree than in the summer, and that winter transmission is very low, probably nil.

The malaria problem of Cyprus is essentially a rural problem.

N. W.

SAUTET (Jacques). Quelques principes de lutte antipaludique en rapport avec l'endémie palustre et la biologie des anophèles. [**Certain Principles relating to Antimalarial Measures with regard to Endemic Conditions and Biology of Anophelines.**]—*Arch. Méd. Gén. et Colon.* 1937. Vol. 6. No. 6. pp. 185–198. With 1 folding chart & 3 figs.

For successful anti-malaria work knowledge of the country, of local endemic conditions and of the biology of the local anopheline

vectors are all necessary. The last two points are considered in this paper and illustrated from experience gained by the author as Director of the Antimalaria Centre of Bastia, Corsica. Though the paper contains nothing strikingly new or original it is well conceived and emphasis is laid on important considerations that are sometimes overlooked.

Nearly all malaria in Corsica is carried by *A. maculipennis* var. *labranchiae* and *elutus*. Their incidence is greatest in May and June; thereafter their numbers diminish but rise again in September, especially in years of heavy rainfall. *Pl. vivax* and *Pl. falciparum* infections are about equally prevalent; quartan infections are much less common. The spring cases are mostly benign tertian. The curve begins to rise in May or June and reaches its height early in August. Though many of the early cases have been infected in the previous year, cases among foreigners and Corsicans coming from healthy parts of the Island show that infections early in the year do take place. Malignant tertian infections occur later; their number is not very considerable till September, the maximum prevalence being observed in October or November, occasionally even in December. Quartan cases occur still later, in winter; more cases have been seen in January than in any other month. Gamete carriers become numerous about August and are found in considerable numbers up to January or February; they are most in evidence in either October or November. Antilarval measures and drug treatment should therefore be carried out with special energy during late summer and in the autumn. As gamete carriers, children and adult foreigners call for special attention and thorough treatment. The author regrets the lack of legal sanction for keeping foreigners in a malarious country under medical surveillance, as they often play a rôle of importance in the dissemination of infection.

The second part of the paper deals with drainage and land reclamation schemes, which should in all cases be based on detailed knowledge of the biology of the local vectors. In all such work the closest possible collaboration between the engineer and the malariologist is indispensable. *N. W.*

WATSON (G. I.). **Some Observations on Mosquito Larvae dying in Anti-Malarial Oils and Other Substances.**—*Ann. Trop. Med. & Parasit.* 1937. Oct. 22. Vol. 31. No. 3. pp. 417–426. [12 refs.]

In published work on mosquito larvicides the criteria of death have received scant attention. Failure to wriggle when touched, inability to reach and remain at the air surface, and the fact that the larvae were motionless and upside down have all been taken as evidence of death. Some such larvae may recover if carefully "nursed." In this interesting paper the author shows that a more accurate measurement of the killing power of a larvicide may be obtained by noting the interval which elapses between the entry of oil into the breathing tubes and the moment when the heart muscle finally ceases to contract. Transverse heart muscle bundles are attached to the two tracheae and the tracheal movements are an easily observed indicator of the heart's activity.

After a drop of oil is placed on water in which a larva is swimming the time taken for a particular type of oil to penetrate the tracheal openings may vary from a few seconds to 10 minutes or longer. With

the more toxic oils the larva wriggles vigorously as soon as it touches the oil film. Having come into contact with one of these irritating oils the larva soon bends round to clean its tracheal openings with its mouth-parts—a performance which frequently precedes and apparently facilitates the entry of oil into the tracheae. With less toxic oils the heart may be beating 6 hours after oil has entered the tracheae; with toxic oils the heart may stop beating in less than 2 minutes. The heart muscle rhythm is generally irregular for some time before the heart finally stops.

Three culicine larvae were placed under a film of non-toxic oil and watched until it was seen that oil had just penetrated the syphon; they were then placed in fresh tap water and washed; two of them subsequently pupated. Recovery has never been seen in any larva which had got even a minimal amount of a highly toxic oil into the end of one trachea.

A larva that is prevented mechanically from reaching the air surface will die, the time taken to do so varying with the amount of available oxygen in the water. During this process of asphyxiation changes in the rhythm and frequency of the heart pulsation may be observed.

Paris green does not act primarily on the heart muscle; it behaves in larvae as in man as a gastro-intestinal poison.

In addition to toxicity other properties of a good anti-malarial oil are discussed, its "stickiness," its power to burn vegetation, its killing power in running water, its cost and its reliability. *N. W.*

BLACKLOCK (D. B.). **Screencloth for Houses in the Tropics.**—*Ann. Trop. Med. & Parasit.* 1937. Oct. 22. Vol. 31. No. 3. p. 447.

In 1935 the author published a paper under the above title in which he recommended a 14-mesh screencloth made of wire of 30 Imperial Standard Wire Gauge for the screening of buildings. Professor GORDON has recently shown, experimentally, that a certain proportion of *A. funestus* and of *Aëdes* are capable of passing through this gauze. The author consequently points out that it is unsafe to use this large mesh gauze, originally recommended as giving the maximum amount of light and air compatible with what then appeared to be safety, without experimental proof of its efficiency in each locality.

N. W.

FAUST (Ernest Carroll). **Certain Factors in the Epidemiology of Malaria in the Southern United States.**—*New Orleans Med. & Surg. Jl.* 1937. June. Vol. 89. No. 12. pp. 692–694.

Although endemic malaria does occur elsewhere, it is only in the southern States that malaria is a compelling public health problem. With the exception of the Appalachian highlands the entire south, as far west as a line drawn north-south through Dallas, Texas, is a vast malarious area. Everywhere *A. quadrimaculatus* is the important vector. The breeding of this species is closely connected with areas of limestone erosion. Statistical information regarding the amount of malaria in the States is very deficient; morbidity data are lamentably poor and unreliable. It has been estimated that for each death caused by malaria there are at least 200 cases; in a recent health report from one State only two cases were reported for each death. The author states that haphazard diagnosis, unscientific treatment and failure

to record and report cases are responsible for the scantiness of exact knowledge regarding the prevalence of malaria in the southern States. The importance of these matters should be impressed on medical students and post-graduates alike. *N. W.*

AKASHI (Kazuyoshi) & YOSHIMURA (Takashi). **Statistical Observations on 816 Cases of Malaria in Tainan District.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1937. Oct. Vol. 36. No. 10 (391). [In Japanese pp. 2248–2261. With 3 charts. [14 refs.] English summary pp. 2261–2262.]

In south Formosa the rainy season is from May to September; the remaining months are almost rainless. Malaria prevalence is low from February to April, when the curve rises steadily till August. A fall in September is followed by a second rise. Benign tertian malaria is more in evidence than malignant tertian throughout the year except in the month of December when malignant tertian cases are more numerous. In other months *falciparum* infections are few. During ten years 816 cases of malaria were admitted to the Government Hospital at Tainan, 6·8 per cent. of total admissions. In a series of 490 cases albuminuria was observed in 36 per cent., nephritis in 10 per cent. All the cases of nephritis were acute. The spleen was palpable in 47·7 per cent. of cases. In a series of 411 cases there were seven cases of malarial polyneuritis. There were twelve fatal cases during the ten years, a case mortality rate of 1·5 per cent. There were 27 cases of blackwater fever, most of them occurring in the dry winter months; eight of them died. *N. W.*

SOARES (Helio de Albuquerque). A esplenomegalia na malaria e seu valor epidemiológico. [**Epidemiological Value of the Spleen Index in Malaria.**]—*Hospital.* Rio de Janeiro. 1937. Nov. Vol. 12. No. 5. pp. 837–840. [11 refs.]

This is a discussion of the value and limitations of the spleen index as a measure of the endemicity of malaria, based on the author's experience in Brazil. It covers familiar ground. *N. W.*

GINSBURG (Jos. M.). **Principles underlying the Protection of Outdoor Meetings from the Mosquito Pest and Methods of Application.** *Proc. 24th Ann. Meeting N.J. Mosq. Exter. Assn. New Brunswick, N. J. 1937.* pp. 5–10. [Summary taken from *Public Health Engineering Abstr.* Wash. 1938. Jan. 1. Vol. 18. Signed James B. LACKEY.]

Experiments up to 1937 indicated that atomizing diluted emulsified kerosene pyrethrum extract until it saturated the atmosphere and covered such assembly areas as porches, halls, lawns or picnic grounds, protected gatherings against mosquitoes without human discomfort or injury to plant life. The prevention is due to repellency by the oil and contact killing of mosquitoes by the pyrethrins. A preliminary spraying of the area kills those present and if the wind moves the fog of spray out of the area a fresh cloud may be spread from the windward side as often as necessary. The type of atomizer—hand to power sprayers—depends on the size of area to be treated. Ten experiments, protecting gatherings of a few to 18,000 people on areas of 1,800 sq. ft. to 16 acres gave very favourable results.

COLLIGNON (E.). La campagne antipaludique de 1936 dans le département d'Alger. [**Antimalaria Campaigns in Three Departments of Algeria, Algiers, Constantine and Oran, in 1936.**]—*Arch. Inst. Pasteur d'Algérie.* 1937. Sept. Vol. 15. No. 3. pp. 383–397. With 12 figs. on 6 plates & 1 chart.

AMBIALET (R.). Observations sur la campagne antipaludique de 1936 et sur les campagnes antérieures dans le département de Constantine.—*Ibid.* pp. 398–410. With 6 diagrams & 6 figs. on 3 plates.

GOUGET (R.). La campagne antipaludique de 1936 dans le département d'Oran.—*Ibid.* pp. 411–423. With 10 figs. on 5 plates & 10 charts.

These three reports give a summarized account of the routine antimalaria work carried out in three departments of Algeria during the 1936 season. They all show that progress is being made in the control of the disease. In all three departments increased attention is being given to Gambusia as a larvicide. *N. W.*

DE PALMAS & SAINZ. Une campagne antipaludique dans un poste du Haut-Tonkin. [**An Anti-Malarial Campaign in Upper Tonking.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. Apr.–May–June. Vol. 35. No. 2. pp. 575–584.

This is an account of the measures that have succeeded in converting a very unhealthy military post in Tonking, situated in an area in which malaria is hyperendemic, into a comparatively healthy station. In 1927 the malaria morbidity of the garrison amounted to 70 per cent. of the strength; the corresponding figure for 1935 was 7·3. This result was achieved by unremitting attention to sanitary measures, the clearing of undergrowth, levelling ground, small drainage schemes, oiling residual water, a general clean up in the neighbourhood of barracks and native dwellings, the use of mosquito nets and the prophylactic use of quinine. All this was carried out by local resources without special budgetary provision. *N. W.*

BARBIERI (Antonio). Los procedimientos de lucha antipalúdica en la Argentina. Resultados hasta 1936. [**Anti-Malaria Campaign in the Argentine.**]—*Prensa Méd. Argentina.* 1937. Dec. 1. Vol. 24. No. 48. pp. 2297–2305.

BOYD (Mark F.) & KITCHEN (S. F.). **Recurring Clinical Activity in Infections with the McCoy Strain of** *Plasmodium vivax.*—*Amer. Jl. Trop. Med.* 1937. Nov. Vol. 17. No. 6. pp. 833–843.

During 4½ years, 149 patients in the malaria therapy service of the Florida State Hospital had clinical attacks of *vivax* malaria following inoculations by anophelines. These were all infected with the McCoy strain. Twenty-one other patients were similarly infected with six other *vivax* strains. Of the former 45·6 per cent. experienced renewed clinical activity after cessation of the primary attack. Of the latter only one, 4·7 per cent., had such an experience. It would appear that the frequency of renewed clinical activity after the cessation of the primary attack varies with different *vivax* strains. This paper deals exclusively with observations made on patients infected with the McCoy strain.

Patients having primary attacks of more than 48 days' duration, of whom there were seven, experienced no renewed activity. Only two of the 13 patients whose primary attack lasted for seven days or less had any subsequent febrile attacks. Renewed activity was most often associated with primary attacks of from 7 to 34 days' duration; it was most frequently observed within 8 weeks of the cessation of the primary attack. The first period of renewed activity is generally shorter than that of the primary attack but it may be longer. Subsequent attacks are apt to be shorter. The length of the incubation period appears to have no relation to the occurrence of renewed activity. The authors consider that periods of renewed activity occurring within 60 days of the onset are essentially a part of the primary attack and that a quiescent interval of five days, after a previously unbroken series of quotidian or tertian paroxysms since the onset, is not sufficient to indicate the termination of the primary attack.

When termination of the primary attack was followed by intensive malaria therapy no further signs of active malaria were observed. Fifty per cent. of the patients who did not receive such intensive treatment subsequently showed signs of renewed activity of the malaria parasite. Patients whose primary attacks were interrupted by small doses of quinine but who received no further malaria treatment invariably suffered from further febrile attacks.

Renewed activity after a quiescent interval of from 8 to 24 weeks was most common in the case of patients infected in the spring. Renewed activity after longer quiescent periods than this was most common among patients inoculated in the autumn. *N. W.*

FARINAUD (M.). Paludisme et coliques hépatiques. [**Malaria and Biliary Colic.**]—*Bull. Soc. Path. Exot.* 1937. Dec. 8. Vol. 30. No. 10. pp. 912–916.

An old lady who had suffered much in the past from biliary colic had had her gall-bladder removed 4½ years before her arrival in Madagascar. The interval had been completely free from attacks. Six months after her arrival in the colony she was seized with a typical attack of biliary colic and was treated accordingly. The attack subsided, but two days later identical symptoms reappeared; examination of the blood showed numerous schizonts of *Pl. falciparum*. Treatment with quinacrine and rhodoquine resulted in complete cure. The description of this case is followed by an interesting discussion of the rôle played by malaria in the causation of biliary colic.

N. W.

LEO (E.). Cancrena dei piedi in un caso di malaria tropicale acuta, perniciosa larvata. [**Gangrene of the Foot in a Case of Malignant Tertian Malaria.**]—*Giorn. Ital. di Clin. Trop.* 1937. Oct. 31. Vol. 1. N.S. No. 10. pp. 297–8, 301.

A very unusual case. A man aged 42, a labourer in an engineering corps, landed in Mogadiscio in February 1937. He was in good health and gave no history of previous illness. Fifteen days before his admission to hospital in June he suffered from pain in the right foot; this was intermittent. He was admitted to hospital where he was transferred to the surgical side on the third day, with the diagnosis

of dry gangrene of the right foot. He died the same day. Examination of the blood revealed an enormous infection of *P. falciparum* "All the red cells were parasitized, each cell containing two, three or four parasites." *N. W.*

JOURNE & AUBIN. A propos d'un cas de psychose palustre. [**A Case of Malarial Psychosis.**]—*Bull. Soc. Path. Exot.* 1937. Dec. 8. Vol. 30. No. 10. pp. 860–865.

A strong adult aged 37 was suddenly taken ill in the Ivory Coast with maniacal symptoms. He suffered from delusions and was incoherent and violent and had to be put in a strait waistcoat. His temperature was raised, up to 104°F. No malarial parasites were found in the blood; he had taken prophylactic quinine. He was treated with quinine and in four days his acute mental symptoms had disappeared. Some two months later he was back at work apparently normal. Nine months after the first attack he was taken ill again after a period of increasing nervousness. Violent mental symptoms, delusions and hallucinations reappeared. There was persistent fever and for at least two months the patient was critically ill; attacks of mental and motor excitability were frequent. This was followed by a period in which the patient was indifferent to his fate. Fever persisted; numerous schizonts of *falciparum* were found in the blood. After six months of serious illness the patient was repatriated to France. On the voyage violent symptoms returned; food was refused. He was extremely emaciated. In France he was treated with quinacrine and praequine. Thereafter there was a steady recovery. Delusions and hallucinations rapidly disappeared. The patient put on weight and the anaemia which had been a prominent symptom disappeared. The author discusses the preponderant rôle which malaria played in the production of this psychosis. The patient had not been an habitual drunkard but he had indulged from time to time in alcoholic excesses. It is indeed possible that alcohol may have played a part in the subsequent development of this "encéphalite psychosique azotémique." *N. W.*

BOYD (Mark F.) & KITCHEN (S. F.). **The Duration of the Intrinsic Incubation Period in *Falciparum* Malaria in Relation to Certain Factors affecting the Parasites.**—*Amer. Jl. Trop. Med.* 1937. Nov. Vol. 17. No. 6. pp. 845–848.

This study concerns 96 successful *falciparum* inoculations by *A. quadrimaculatus*. Five strains, all of local origin, were used. The incubation periods varied from 6 to 25 days; 11 days in about half the cases. The 43 inoculations made with the Long strain all had incubation periods of from 9 to 13 days. Different strains have very varying incubation periods. The 42 cases infected with the Coker strain had incubation periods varying from 6 to 25 days. The duration of the intrinsic incubation period was not influenced by any of the following factors:—Inoculation of the mosquito infector by blood or mosquitoes; age of the sporozoites; duration of the incubation period in the mosquito infector; probable duration of extrinsic incubation period; quantitative infection of inoculating mosquitoes; race of the patient. An increase in the number of infected mosquitoes used only rarely appeared to have any influence in the direction of shortening the incubation period. *N. W.*

MAYNE (Bruce). **Protracted Incubation in Malarial Fever. Report of a Case and a Review of the Literature.**—*Public Health Rep.* 1937. Nov. 12. Vol. 52. No. 46. pp. 1599–1607. [36 refs.]

On October 14th, 1935, the author obtained a suspension of *Pl. vivax* sporozoites ("Madagascar" strain) from *A. maculipennis* var. *atroparvus* from the Horton Laboratory. The culture medium used was defibrinated human blood to which sodium dextrose, 1 per cent., was added. The suspended culture was taken to the U.S.A. and on October 23th was inoculated into a patient. The first malarial paroxysm followed a year later, October 6th, 1936. He was under continual observation throughout this prolonged incubation period. There was no possibility of a reinfection. The malaria attack was a severe one. After seven paroxysms, with maximum temperatures of from 105 to 106°F., it was necessary to intervene and terminate the attack. Typical *vivax* parasites were found in the blood. This is the first case of experimental protracted incubation reported from America.

The author gives an interesting summary of the literature of protracted incubation, or long latency, of malaria most of which has been noted in this *Bulletin.* *N. W.*

D'ANTONI (Joseph S.). *Plasmodium ovale.*—*New Orleans Med. & Surg. Jl.* 1937. June. Vol. 89. No. 12. pp. 691–692.

This is a concise description of *Pl. ovale*, with special regard to the points which distinguish it from *vivax* and *malariae.* No case of *ovale* infection has as yet been reported from the United States.

N. W.

AKASHI (Kazuyoshi) & NAKASHIMA (Yoshio). **Henry's Melano-flocculation in Malaria.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1937. Nov. Vol. 36. No. 11 (392). [In Japanese pp. 2533–2544. [65 refs.] English summary p. 2545.]

Henry's reaction was positive in 117 cases of malaria out of 125 examined. The 8 patients who gave a negative reaction were early cases, the 4th or 5th day of fever. A positive Henry's reaction was noted in catarrhal jaundice; cases of hepatic cancer with jaundice gave a negative reaction. Three cases of ? undulant fever gave a positive reaction as did 4 out of 14 cases of exanthematic typhus; 5 out of 25 cases of typhoid fever, and one case of pernicious anaemia. A slightly positive reaction was obtained in two out of 11 cases of syphilis. The authors consider that melanin acts merely as an indicator and not as an antigen. Even though positive reactions do occur in diseases other than malaria they consider Henry's reaction to be of great use in the diagnosis of malaria. *N. W.*

RAYNAL (J.). La réaction de Henry au Tonkin. Résultats de 853 mélano-floculations. [**Results obtained in 853 Henry's Reactions in Tonking.**]—*Arch. Insts. Pasteur d'Indochine.* 1937. Apr. Vol. 7. No. 25. pp. 27–35.

Henry's reaction was carried out in the case of 500 individuals of whom 120 were healthy, 121 were suffering from diseases other than malaria, 68 individuals had a positive Bordet-Wassermann reaction,

106 were harbouring malaria parasites in the blood, and the remainder had suffered or were suffering from malaria though no parasites were found. As a result of this experience the author considers the reaction to be of diagnostic value in cases of malaria in which parasites are not found in the peripheral blood. In non-malaria cases which give a strongly positive Bordet-Wassermann reaction a positive Henry's reaction not uncommonly occurs ; this is a point to be borne in mind. In the choice of donors for blood transfusion, especially in tropical countries, a melano-flocculation reaction, as well as a Bordet-Wassermann reaction, should be carried out. Henry's reaction is a useful indication of the success of treatment of malaria ; the reaction becomes negative under the influence of judiciously applied treatment.

N. W.

FAIRLEY (N. Hamilton). **Liver Insufficiency in Malaria.**—Congrès International de l'Insuffisance hépatique, Vichy, 16–18 Septembre 1937. 13 pp. [25 refs.]

This is a comprehensive description of the structural and functional changes in the liver that are attributable to malarial infections. The subject is considered under three heads : pathology, clinical aspects, and liver function tests. Enlargement of the liver is commonly found in malaria, sometimes with a distended and tender gall-bladder. Post-mortem, the swollen liver shows congested venules containing parasitized red cells ; the Küpffer cells contain clumps of brown malaria pigment, and the polygonal cells haemosiderin. Cloudy swelling of the parenchyma cells, and even necrosis, are sometimes seen. Jaundice, which is not infrequent, may be of haemolytic or toxic origin. Haemolysis is mainly intracellular ; the haemoglobin is broken down into haemosiderin, which is deposited in the cells of the liver, spleen and kidneys, and haemobilirubin which circulates in the blood and causes haemolytic jaundice. The excess of haemobilirubin is converted into cholebilirubin. The resulting pleocholia causes bilious vomiting, bilious stools and urobilinuria. Intravascular haemolysis occurs in blackwater fever ; the circulating haemoglobin is partly excreted in the urine and partly converted into pseudo-methaemoglobin.

The clincial types of malarial involvement of the liver are :—enlarged liver with gastritic symptoms and sometimes decreased acid secretion ; bilious remittent fever associated with either haemolytic or toxic jaundice ; in the latter, bile salts and pigment appear in the urine, the plasma gives a direct biphasic or delayed van den Bergh reaction and the bromsulphaline dye test may be positive ; pigment gall stones ; and malarial cirrhosis of the liver, which the author describes as a clinical, not a pathological, entity. *N. W.*

HELMINTHIASIS.

BOGLIOLO (Luigi). Sopra i rapporti tra elminti e blastomi. [**Helminths and their Connexion with Neoplasms.**]—*Riv. di Parassit.* Rome. 1937. Oct. Vol. 1. Suppl. Monogr. No. 2. 60 pp. [209 refs.]

A study of the literature leads to certain conclusions on the connexion between worms and malignant disease.

Cysticercus fasciolaris, adult *Gongylonema neoplasticum* and the eggs of *Schistosoma haematobium* are cancer producing, probably by irritation. The first two are associated, in natural conditions, with cancer in animals, and in experimental infections are found with cancer cells; the last unusually often with cancer of the bladder. It is not certain that *O. felineus*, *C. sinensis*, *S. mansoni*, *S. japonicum*, *Gongylonema formosana* and *T. echinococcus* are so associated, and there is much doubt regarding *Rhabditis pellio*, *Hepaticola gastrica*, *Muspicca borreli*, *Trichosomoides crassicauda*, "*Strongilidi*" especially *Muellarius capillaris* and *Trichinella spiralis*. *Clayton Lane.*

SUDAN: REPORT OF THE SUDAN MEDICAL SERVICE FOR THE YEAR 1936. [**Schistosomiasis** pp. 22–25.]

A record of the fine advance which has been made in the last ten years in the control of schistosomiasis in the Sudan.

In the Dongola and Merowe Districts of the Northern Province the fall in percentage of infection by *S. haematobium* has been from 16 to 3·4; in the Wadi Halfa District, surveys have only recently begun, the percentage of this infection was 19·46 in 1934 and 12·9 in 1936; in the Damer District a small focus of infection with *S. mansoni* was discovered in 1935 and, after vigorous steps, no fresh infections have been found. In the Blue Nile Province, in which during the last eight years annual examinations have increased in number from 2,341 to 28,087, the infection rate in the first four years averaged 0·885, in the last four 0·115. The remarks by Dr. Goss, Senior Medical Inspector of this Province, are:—

"Our chief means of security against bilharzia are sanitary measures combined with treatment.

"Preventative methods are of prime importance and comprise protection of canals against fouling and the supply of good drinking water from wells.

"To prevent fouling three measures are taken: placing of villages not less than 300 metres from canals, fencing of canals and the provision of latrines.

"The provision of deep wells is a certain remedy against bilharziasis, provided they are used, but the presence of a perennial supply of canal water all over the Gezira is too great a temptation to the average native and he will usually take water from a canal even if his village has a well. The majority of old wells in this area have fallen into disuse. Steps are being taken to open up old wells and to sink new ones. Five new wells have been sunk in the new Fawar area but, and before further expense is incurred, it must be seen whether they are being used. Issuing of regulations is an easy matter, but their observance relies entirely on the common sense and good will of the native.

"The co-operation of the native still lags very much behind the efforts of the Government and without a small army of officials we cannot be sure that sanitary regulations are observed over such a widespread area as the Gezira.

"The yearly influx of labour from the western Sudan and outside, is a real danger. Large numbers of these people are infected with bilharzia. They have no idea of sanitation and are a wandering population under very little control. Formerly an attempt was made to examine them at various quarantine stations outside the Gezira but this examination was easily evaded.

"The key to the solution is to have them examined and treated before they enter the Gezira, but the difficulties of carrying this out are great as very few will present themselves voluntarily." *C. L.*

CICCHITTO (Elio). La bilharziosi in Libia. [**Bilharziasis in Lybia.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Aug. Vol. 18. No. 8. pp. 494–509. [29 refs.]

A survey in Italian of literature which has been reviewed in this *Bulletin.* *C. L.*

GALLIARD (Henri), DANG-VAN-NGU & PHAN-HUY-QUAT. Recherches sur le parasitisme intestinal à Hanoi. [**Intestinal Parasites of Hanoi.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1937. June–July. Vol. 15. No. 6. pp. 645–648.

Four methods of faecal examination were compared in 10 cases, namely the smear, a double gravity precipitation of the writers' devising, Telemann's and Garin's.

The authors' method is described as requiring no special material, no loss of time and a minimum of manipulation; two decantations after standing for 20 to 30 minutes suffice. It was tested on 10 cases against a smear of unstated size, Telemann's method, and Garin's method, and came out best—how much best is not clear, for text and table differ, the number of infections detected by it being either 6 or 5 better than the smear, 4 or 3 better than Telemann's and 4 or 3 better than Garin's. When 500 stools of patients were examined at random, the percentage infections by smear and by this sedimentation method were respectively ascaris 59, 64; trichuris 50, 55; ankylostomes 12·5, 21·05; clonorchis 6·6, 8·16; strongyloides 0·23, 1·57; "*Taenia solium*" 0, 0·8; enterobius 0·6, 1; amoebic cysts 5·18, 10·26; amoebic cysts with 4 nuclei 1·88, 2·37; giardia cysts 0·4, 0·8. The size of the smear or the amount of faeces used for the double sedimentation, presumably after faecal disintegration, are not mentioned. *C. L.*

MAKAR (N.). **Bilharziasis of the Gall-Bladder.**—*Jl. Egyptian Med. Assoc.* 1937. Nov. Vol. 20. No. 11. pp. 512–524. With 8 figs.

This is believed to be the first case in which bilharzial cholecystitis has been reported in the living.

Ten years earlier the man had been treated with benefit by tartar emetic for bilharzial cystitis and dysentery. The present condition suggested cholecystitis, but as he did not improve under ordinary "antiparasitic" treatment the gall bladder was removed and in its wall were found coupled worms with living and dead eggs and a histiocytic reaction. This was thickened, with submucous infiltration, fibrosis and calcification. *C. L.*

MAKAR (N.). **A Preliminary Note on Bilharzial Lesions of the Prostatic Urethra.**—*Jl. Egyptian Med. Assoc.* 1937. Nov. Vol. 20. No. 11. pp. 499–511. With 6 figs.

Urethral examinations for haemospermia have allowed of the prostatic urethra being examined at a stage of bilharzial infection before it has become inaccessible to this form of examination.

The lesions fall into two stages, congestive and atrophic. Two cases of each are described, illustrated by reproductions of their appearances through the urethroscope. *C. L.*

KOPPISCH (Enrique). **Studies on Schistosomiasis Mansoni in Puerto Rico. IV. The Pathological Anatomy of Experimental Schistosomiasis Mansoni in the Rabbit and Albino Rat.**—*Puerto Rico Jl. of Public Health & Trop. Med.* 1937. Sept. Vol. 13. No. 1. pp. 1–54. With 54 figs. on 19 plates. [18 refs.] [Spanish version pp. 55–114.]

The pathological changes induced by this infection in these two animal species are closely described.

Since the changes in rabbit differ from those in rat and in both are other than those seen in man and monkey, they are not directly applicable to human pathology. Koppisch suggests that it must not be concluded that their differences from those in man are not in part due to results on the one hand of a single infection such as the animals had and on the other of the multiple infections which presumably are usual in man. In the two series of hosts the changes are followed organ by organ, and by the hour or day. Larvae reach the great veins by the lymph stream, the lymph nodes rarely appearing to destroy them judging by sections ; they are very rarely found in blood vessels, so it is concluded that they rarely travel by the blood stream. There was no evidence that they travelled by boring through tissues. Petechial haemorrhages might occur in lungs, thymus, stomach and liver, and since serial sections might show no larvae near them, it is questioned whether they are traumata caused by larvae. Cells of the reticulo-endothelial system were conspicuous about the parasites of all ages and in all organs. *C. L.*

CHU (C. F.). **Schistosomiasis Japonica in Nanking.**—*Chinese Med. Jl.* 1937. Nov. Vol. 52. No. 5. pp. 651–664.

The condition and treatment of 39 cases of Japonic schistosomiasis are detailed.

Apart from ordinary conditions, it is noted that the cause of about 20 per cent. of cases of cirrhosis of the liver was schistosomiasis, and that this infection was the probable cause of much of the so-called idiopathic nodular cirrhoses of the liver.

" Moderate anemia was found in most of the chronic cases. The high eosinophilia and leucocytosis are of considerable importance in the clinical diagnosis of the disease but they may not be found in certain cases. Positive globulin test was found in about two-thirds of the cases on which the test was done . . . .

" Eleven cases were treated by fouadin with five failures. It was found that very large doses of fouadin had to be pushed in order to get the therapeutic effect. Tartar emetic was used with good response in four

cases, neostibosan appeared to be entirely useless. It appears that tartar emetic is the most effective and economical remedy that we have at our disposal at the present time." *C. L.*

BULLETIN MÉDICAL DU KATANGA. 1937. Mar. Vol. 14. No. 1. pp. 46–48. —Les réactions hépato-spléniques dues à *Schistosoma mansoni*. [**Reactions to *S. mansoni* in the Liver and Spleen.**]

CAWSTON (F. G.). Recent Advances in the Cure of Bilharzia. [Correspondence.]—*South African Med. Jl.* 1937. Oct. 9. Vol. 11. No. 19. p. 703.

WU (Kuang). **Susceptibility of Various Mammals to Experimental Infection with *Fasciolopsis buskii* (Trematoda : Fasciolidae).** —*Ann. Trop. Med. & Parasit.* 1937. Oct. 22. Vol. 31. No. 3. pp. 361–372. With 2 plates. [17 refs.]

"Twelve species of mammals, represented by 6 pigs, 4 dogs, 1 buffalo, 6 rabbits, 1 monkey, 4 cats, 1 sheep, 1 goat, 1 ox, 5 guinea-pigs, 5 albino rats and 10 mice, were fed with *F. buskii* cysts and autopsied at different intervals. Practically all helminths develop to maturity in pigs when these are lightly infected. As far as was ascertained, the worms remain immature in dogs. In rabbits, both immature and mature stages of *F. buskii* were met with, and there is a possibility that this host may prove a suitable experimental animal for *Fasciolopsis* work. Immature worms were noted in the young buffalo, but there is not sufficient evidence to say whether they might develop further. The remaining animals (monkey, cats, sheep, goat, ox, guinea-pigs, rats and mice) appear at present resistant to *Fasciolopsis* infection." *C. L.*

SHIMIZU (K.) & KAWADA (T.). **Prevention of Distomiasis Hepatis as carried out in Okayama Prefecture.**—*Jl. Public Health Assoc. Japan.* 1937. Sept. Vol. 13. No. 9. pp. 1–4.

Measures taken for the prevention of infection by *Clonorchis sinensis* are given.

They are firstly the keeping of ducks infected with *Notocotylus attenuatus*; for these infect snails which are described as *Bulinus striatulus japonicus* Pilsbry, and render them sterile, so that they are no longer able to reproduce and so to spread clonorchis infection; this measure has been going on for some years, in the villages of Fukuda and Okiyo, and, whereas before a single dip of the net brought up two or three hundred of these snails, it now brings up five or six only. Secondly "fighting fish (Paradise fish)" destroy these snails and have been bred and let loose where the snail is present. Thirdly, there is spread of knowledge by lectures and the cinema. Faecal examinations have also been made before (on 2,508) and after (on 2,285) a treatment held appropriate for round worms and hookworms; the infection figures obtained before and after such treatment were respectively, for roundworms 263 and 251, hookworms 497 and 630, liver flukes 432 and 807, others 353 and 434. It is gathered from the abstract that they concern the same persons. [The general increase in apparent infection is striking.] The future policy is to follow these same lines. Further a leaflet is being distributed urging that, for the good name of the Okayama prefecture, river fish should not be eaten unless fully

cooked, that no unboiled or unfiltered water should be used for drinking, for washing food, or cooking or feeding utensils, for washing the face, for gargling or for bathing. *C. L.*

EJSMONT (L.). *Opisthorchis tenuicollis* (=*O. felineus*) en Pologne. Cas observés chez l'homme. [**Infestation of Man by** *Opisthorchis tenuicollis* **in Poland.**]—*Ann. Parasit. Humaine et Comparée.* 1937. Nov. 1. Vol. 15. No. 6. pp. 507–517. With 2 figs. [40 refs.]

The author believes that the name *Opisthorchis felineus* (Rivolta, 1884) should lapse as a synonym of *Opisthorchis tenuicollis* (Rudolphi, 1819). Two more cases are reported from man in Poland.

C. L.

CAWSTON (F. G.). Recent Advances in the Cure of Bilharzia. [Correspondence.]—*South African Med. Jl.* 1937. Oct. 9. Vol. 11. No. 19. p. 703.

TARASSOV (V.). De l'immunité envers le bothriocéphale *Diphyllobothrium latum* (L.). [**Immunity to Re-Infection by** *Diphyllobothrium latum.*]—*Ann. Parasit. Humaine et Comparée.* 1937. Nov. 1. Vol. 15. No. 6. pp. 524–528.

It is believed that an infection with *D. latum* gives rise to an immunity lasting 2 or 3 years but not longer.

The village of Podnavolok in Karelia had 143 inhabitants. All submitted to examination and 125 (86·7 per cent.) were infected with *D. latum*, most of the uninfected being young children. Of the infected 60 were unwormed; three years later 20 were again found infected, 40 were not, an immunity seemed to be in existence. Tarassov then infested himself by swallowing a series of plerocercoids, all from the pike. On 7th May, 1932, he swallowed 7 plerocercoids, on 21st May, 1932, onchospheres appeared, on 12th June he expelled 38 metres of strobile with 7 heads; while still harbouring them he had much abdominal pain, lost 8 kgm., and weakness forced him into a sanatorium. On 22nd August, 1933, he swallowed 6 more plerocercoids, on 7th September, 1933, onchospheres appeared, on 29th September, he expelled 6·3 metres of worm and two heads. On 13th August, 1934, he swallowed 7 plerocercoids without infection. On 17th August, 1935, he swallowed 6 more with no infection. On 25th July, 1936, he swallowed 6 more, eggs appeared on 12th August and 4 heads with 26 metres of strobile were brought away on 12th September. After these various expulsions, passage of onchospheres or segments ceased in all instances. *C. L.*

NARIHARA (Norio). **A Case of Human Infestation with Rat Tapeworm** (*Hymenolepis diminuta* **Rudolphi**) **in Formosa.**—*Taiwan Igakki Zasshi* (*Jl. Med. Assoc. Formosa*). 1937. Oct. Vol. 36. No. 10 (391). [In Japanese pp. 2285–2289. With 2 figs. [34 refs.] English summary p. 2290.]

" The author found the eggs of this worm in the faeces of a girl of 8 years of age in Taihoku City, and as a result of a vermifuge the worm was passed

and measured 25 cm. in length with approximately 1,066 segments without scolex." *C. L.*

ROMAN (E.). Hôtes intermédiaires nouveaux d'*Hymenolepis diminuta* (cestodes hyménolépididés). [**New Intermediate Hosts of** *H. diminuta*.]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 24. pp. 26–28.

To the intermediate hosts of *H. diminuta* are added *Aphodius distinctus* and *Anobium* (*Stegobium*) *paniceum*. They are not thought to be important. *C. L.*

GODFREY (M. F.). **Hydatid Disease. Clinical, Laboratory and Roentgenographic Observations.**—*Arch. Intern. Med.* 1937. Nov. Vol. 60. No. 5. pp. 783–804. With 8 figs. [34 refs.]

This general survey covers the history of the infection from the time of its acknowledged presence in Jewish sacrificial animals, its distribution on the globe, its life cycle, its incidence in various organs, its diagnosis including the various laboratory tests, and the X-ray appearances in various organs, the last taking up, with its illustrations, the greater part of the paper and including the differential diagnosis of what is there seen. *C. L.*

WINFIELD (Gerald F.) & YAO (T. N.). **Studies on the Control of Fecal-borne Diseases in North China. IV. Vegetables as a Factor in the Spread of** *Ascaris lumbricoides*.—*Chinese Med. Jl.* 1937. June. Vol. 51. No. 6. pp. 919–926.

"Until other sources of infection have been excluded by adequate epidemiological studies it does not seem to us to be admissible to consider that contaminated vegetables are the major source of infection for *Ascaris lumbricoides*. Our data seem to make it clear that in North China this source of infection is negligible."

This paper continues studies already reported [this *Bulletin*, 1937, Vol. 34, p. 870]. It begins by a survey of the literature on vegetable-borne ascaris infection [this *Bulletin*, 1934, Vol. 31, p. 611; 1936, Vol. 33, p. 949] and passes on to report on results of examinations of salted and of fresh vegetables nearly all from the Tsinan market, and of the soil on which they were grown. There was for vegetables an examination either of the centrifugal precipitate of the water in which they had been washed, or by centrifuging in a "high specific gravity solution of salt, sugar, or sodium dichromate." [A saturated solution of common salt with s.g. 1200 is not dependable as a floater of ascaris eggs, this must be as high as 1300 (LANE, this *Bulletin*, 1926, Vol. 23, p. 261)]. The total washings from 274·5 kg. of vegetables did not reveal a single parasite egg, nor were any found on celery, leeks, cabbage and beans from a vegetable garden in Lungshan, though 3 ascaris eggs were found in one of 5 samples of its soil. In the sediment of containers in which salt vegetables had been kept, no ascaris eggs were found, though there were present those of plant parasites. Of 49 samples of soil from vegetable gardens 57·1 per cent. showed ascaris eggs. As an explanation of their general absence from vegetables in this area it is suggested that the human faeces are used dried and are dug well into the soil, and if they are splashed up on to vegetables they are easily washed off by rain, and if not their development may be stopped by their drying. *C. L.*

NOLASCO (J. O.) & GACOBA (C.). **Helminthiasis in Children of Pre-School Age in the Non-Leper District of Culion.**—*Monthly Bull. Bureau of Health.* Manila. 1937. July. Vol. 17. No. 7. pp. 253–264. [11 refs.]

"A quantitative survey of stools of 230 children of pre-school age was carried out in two areas in the non-leper district of Culion—150 from Culañgo and Jardin and 80 from Balala.

"The results for ascaris were as follows:—for Culañgo and Jardin 67·3 per cent. incidence with an average count of 15,410 eggs per gram of feces, and for Balala 37·5 per cent. incidence with an average egg count of 5,870, or an estimated average worm load of about 16 worms for Culañgo and Jardin and 6 worms for Balala.

"The results for trichiuris were as follows:—for Culañgo and Jardin 55·3 per cent. incidence with an average of 450 eggs per gram of feces, and for Balala 25 per cent. incidence with an average of 270 eggs.

"In both localities the ascaris and trichiuris infestations have been found to show a tendency to concentrate in a small number of individuals.

"Seven children in Culañgo and Jardin and one child in Balala all below the age of two years were found infested with ascaris; and one child in Culañgo and Jardin and one in Balala, also all below the age of two, were found infested with trichiuris. In these very young cases, it is assumed that the infestations were probably acquired from the floors of their houses, polluted by the promiscuous defecation of their elder brothers."

The method of diagnosis was that of Stoll. *C. L.*

SARGENT (Willard S.). **Acute Intestinal Obstruction due to Round-worms.**—*U.S. Nav. Med. Bull.* 1937. Oct. Vol. 35. No. 4. pp. 482–484.

The boy recovered without operation.

A collapsed boy of 10 had a mass about the right iliac fossa, doughy and feeling much like worms. The abdomen was distended. An enema brought away faeces with ascaris ova and an improvement in his general state. As the lump persisted the enema was repeated. It left him with the mass but with no pain. By morning there was no lump, and oil of chenopodium and then santonin brought away 87 worms. He left hospital well four days later. *C. L.*

SORONDO CAMPANERÍA (Emilio). Contribución al estudio de la terapéutica del parasitismo intestinal. El chenopodium anthelminticum y sus intoxicaciones. [**On the Treatment of Intestinal Parasitism.** *Chenopodium anthelminticum* **as a Poison.**]—*Medicina de Hoy.* Habana. 1937. June. Vol. 2. No. 6. pp. 357–366. French summary.

Oil of chenopodium is held to be the anthelmintic of election for ascaris and hookworm.

The author holds that a single treatment will get rid of 60 to 70 per cent. of necators, 90 to 99 per cent. of ascaris and large numbers of trichuris, enterobius and *Hymenolepis nana.* Toxic symptoms the author has found to include burning sensation, nausea, deafness, profound coma. He had two deaths, one after advised doses, and one to whom the child's mother gave, it seems, generous spoonfuls.

C. L.

BROWN (Harold W.). **Observations on the Mode of Action of Several Anthelmintics upon** *Ascaris lumbricoides* **(Pig Strain).**—*Amer. Jl. Hyg.* 1937. July. Vol. 26. No. 1. pp. 72–83.

"It has been shown that ascaris will ingest various solutions such as normal saline and mineral oil. They will also ingest solutions of certain anthelmintics such as carbon tetrachloride in mineral oil. On the other hand, they refuse to ingest mineral oil solutions of chenopodium, even in very great dilution.

"It has also been shown that the anthelmintics here studied act more rapidly when ascaris is immersed in solutions or suspensions of them than when such solutions are injected orally into the gastro-intestinal tract of the parasite. From these experiments it would seem that the mode of action of these anthelmintics on ascaris is through the body wall rather than after ingestion by the parasite.

"These experiments have also shown that a delayed death results when a small portion of a worm is injured by an anthelmintic applied locally." *C. L.*

SCOTT (J. Allen). **The Prevalence and Distribution of Hookworm Infection in Egypt.**—*Amer. Jl. Hyg.* 1937. Nov. Vol. 26. No. 3. pp. 455–505. With 8 maps & 3 graphs. [18 refs.]

Of the 12 million rural people in Egypt about 5 million have hookworm infection. Over most of the country the rate of infection is about 50 per cent., at the north of the Delta the figure is less than 20, in the Fayum Province about 15, and it reaches 90 in some villages.

The data used are of two kinds. First those collected by the Endemic Diseases Section of the Public Health Department as the result of examinations of stools passed by about 2 million patients on arrival at hospitals; second, those made under Allen Scott's supervision from stools passed by people in their homes, about 40,000 in all. The hospital figures had been got by a floatation technique; those at the houses by a Stoll-Hausheer count of 1 slide (0·005 cc.). In order to check the relative values of the two series, 253 specimens which had been examined at a hospital were re-examined; the hospital floatation method gave a discovered percentage of infection of 30, a single egg count slide one of 35, three egg count slides one of 43. The floatation method had missed 38 specimens found positive by the Stoll-Hausheer slides and these missed 5 which the floatation method had found, but when the Willis method and the Stoll method were both used on the same series of stools the former always yielded more positives. The percentage of positive cases varied from 0 in 500 examined at Minshat Rabia in the Fayum Province to 89 in 101 examined at El Qawadda in the Sharkiya Province. The two series differed not only in the diagnostic techniques used: the hospital group had few children and was to some extent selected for illness, while the other gave the exact locality of those examined. The house-to-house visits bring out high rates of infection, of 70 and 89, in Delta villages standing on sandy soil on the desert's edge. The two sets of findings are carried on along the Nile from Cairo to Aswan in two maps whose legends have evidently been transposed. In Fayum Province are two villages within 2 miles of one another, the infection rate to the single Stoll-Hausheer slide being 2 in one and 50 in the other; and the cause of the difference could not be determined. The conjectured total of 5 million infected takes into account the conviction that "the available methods of examination miss many cases." Again, "attempts to

convert egg-count figures into estimates of worm burdens involve such large errors" that Scott does not make them. He points out, as the essential conclusion of his discussion, that on the average there go together a high percentage of infected persons and a large number of worms in each infected person, and that the "constant relation between prevalence and intensity throughout the country has important implications in any study of the epidemiology of hookworm disease."

C. L.

SCOTT (J. Allen). **Observations on the Transmission of Hookworm Infection in Egypt.**—*Amer. Jl. Hyg.* 1937. Nov. Vol. 26. No. 3. pp. 506–526. With 16 figs. on 7 plates & 1 map. [11 refs.]

"Soil pollution is very common throughout and immediately surrounding Egyptian villages. Out of hundreds of specimens of soils from these localities, however, no hookworm larvae have been isolated. This failure of development is explained by the excessive dryness of the soils under these conditions, the hard packed nature of the surface, and the fact that most village soils inhibit the development of larvae even in cultures where physical factors are held near their optimum values. This inhibition is tentatively attributed to the presence of excess chlorides or an associated factor. Field soils almost invariably are good culture media when moisture and physical conditions are held near the optimum. In spite of this, few larvae have been recovered from hundreds of isolations from such fields where pollution seemed to be occurring regularly. Several factors may have been the cause of this failure to find larvae here. Such fine clay soils commonly do not serve as good media for developing hookworm larvae under normal environmental conditions. Even with irrigation the moisture content frequently falls fairly low on the surface and under such conditions the hot sun may kill many larvae. Furthermore, the inhibiting condition was shown to be present to some extent in the marginal portions of fields, *i.e.*, the parts where defecation is most common. Most important of all perhaps is the fact that defecation is always scattered in the fields, and the chances of contacts with places where many infective larvae develop are extremely slight. Occasionally concentration of stools occurs just above the water line of canals, ponds or river, and from such places large numbers of larvae have been isolated. As a rule, however, even here pollution is not concentrated, and these places probably only occasionally and in particular localities act as important sources of infection. It is probable, then, that little infection is acquired either in or adjacent to the villages. In the fields and near the water level of canals, ponds and river, soil infestation is widespread but seldom intense. These observations harmonize with the facts of distribution of the parasite, *i.e.*, the widespread, but low grade, human infection probably results from the fact that a dispersed type of field pollution produces widespread and low grade soil infestation, and from the fact that concentrated soil pollution occurs only where the conditions are unfavourable for larval development. In contrast to these relationships are the heavy hookworm burdens of people in other countries where concentrated pollution in places suitable for hookworm development leads to spots of intense soil infestation."

C. L.

KELLER (A. E.), LEATHERS (W. S.) & KNOX (J. C.). **The Present Status of Hookworm Infestation in North Carolina.**—*Amer. Jl. Hyg.* 1937. Nov. Vol. 26. No. 3. pp. 437–454. With 3 maps. [11 refs.]

As the result of the examination by the Stoll-Hausheer method of 0·005 gm. of faeces from each of 37,391 white persons and of 6,301

negroes, the percentage of detected infection was 12·3 for the first group and 4·0 for the second.

This is a continuation of the investigation by the same technique already put through in North Carolina, South Carolina, Mississippi, Kentucky and Tennessee, and these new and strictly comparable findings made by this technique are compared with the old ones got by the Rockefeller Sanitary Commission in 1910–1914, with the conclusion that since that date there has been in these States a percentage reduction in the incidence of hookworm infection of 66·4, 33·7, 62·5 77·3 and 72·8 respectively. The incidence so detected varied from 0·9 per cent. in Durham County, which is on clay, to 52·9 in Onslow County, which is on sand or sandy loam, and it is noteworthy that in the latter county the percentage found in negroes was 16·0, which again was the highest for the race in the State. The incidence was low in those under five years old and reached its peak in persons 15 to 19 years of age. Sex had no appreciable effect, but that of the family as shown by the number of infected in it and their weight of infection was evident. The average weight of infection was indicated by 3,100 eggs per cc. of faeces in white persons and 1,600 in negroes. "For the entire series of examinations, 20·8 per cent. of all the positive examinations contained 2,600 or more eggs per cc. of faeces, which is the intensity level at which clinical symptoms are likely to occur."

[The percentage of reduction quoted depends on the assumption that the size and optical density of the faecal smears actually examined by the Rockefeller Commission were the same as those of the Stoll-Hausheer technique. The present extent of infection as shown by this technique, which examines 0·005 gm. of faeces, can hardly be the real figure if Stoll was right in calculating that a single female Necator lays eggs at the rate of one to every 0·05 gm. of mushy faeces and of two in that quantity of solid faeces.] *C. L.*

Pessôa (S. B.) & Pascale (Humberto). Pesquizas sobre a ancylostomose em S. Paulo. I. Sobre o methodo de Stoll-Hausheer para a contagem de ovos nas fézes. [**Investigations on Ankylostomiasis in São Paulo. I. On the Stoll-Hausheer Method for counting Eggs in Faeces.**]—Reprinted from *Rev. Biol. e. Hyg.* 1937. Aug. Vol. 8. No. 1. pp. 27–36. [11 refs.]

The authors examined 31 cases by this method and found no relationship between egg counts and worms recovered by treatment, and point out that as a method of diagnosis of infection this method cannot detect those which are light.

The faeces arrived at the laboratory on ice within 12 hours of being passed and were in a perfect state of preservation. Infected persons were treated with carbon tetrachloride, tetrachlorethylene, or oil of chenopodium, and the worms passed were collected and counted. All but about 1·3 per cent. were necators, so that the question of any different worm-egg ratio between *A. duodenale* and *N. americanus* could in practice be disregarded. After two treatments evidence of unworming was got by Willis' method. A table shows that the number of eggs in a gram of faeces average 36·5 for each female recovered, with, however, variations from 3 to 300. The weight of infection as influencing the fecundity of female worms is shown in two tables; when the number of female worms recovered was from 1 to 26 the number of eggs in 1 g. of faeces per female worm averaged 85·9 (33

to 300), when it was between 38 and 242 the eggs per gram per female worm averaged 28·9 (6 to 82); in nine cases negative to the Stoll-Hausheer technique and treated, the mean number of females expelled was 3·7 (1 to 11). Again there were treated 11 cases negative to the simple smear and 9 negative to the Stoll-Hausheer method; of the former 7 expelled worms, of the latter 8, the total numbers expelled being respectively 30 and 47. The authors give full credit to those who have already reported similar findings. *C. L.*

PESSÔA (Samuel B.) & PASCALE (Humberto). Pesquizas sobre a ancylostomose em São Paulo. VI. Intensidade da ancylostomose nos escolares de varios municipios. [**Incidence of Ankylostomiasis among School-Children in São Paulo.**]—*Folha Med.* 1937. Dec. 15. Vol. 18. No. 35. pp. 589–591.

The authors examined by Stoll's method the faeces of school-children of five municipalities in São Paulo. The total examined was small, 1,177; of these 888, or 75·4 per cent., were passing Necator ova. Boys numbered 617, girls 560, and the relative percentages positive were 77·7 and 73·5. The lowest infestation was in Santo Amaro, but even there among 393 there were 52·4 per cent. positive; in the coastal districts it was higher, in São Sebastião 98·8 per cent. of 172 and in Villa Bella 97·2 per cent. of 109. Among those living in houses furnished with latrines the percentage was 70·1 and among those without them 85·2. Of the latter as many as 86 per cent. of those under 9 years of age were infected. *H. H. S.*

CICCHITTO (Angelo M.) & CICCHITTO (Elio). L'anchilostomiasi nei paesi caldi. [**Ankylostomiasis in Warm Climates.**]—*Policlinico.* Sez. Prat. 1937. Oct. 11. Vol. 44. No. 41. pp. 1936–8, 1941–2, 1945–9. With 4 figs. [25 refs.]

MARTILLOTTI (F.). Su alcuni casi di anchilostomiasi nell'infanzia. (Considerazioni epidemiologiche e cliniche.) [**Some Cases of Ankylostomiasis in Childhood. (Epidemiological and Clinical Considerations.)**]—*Pediatria.* 1937. Sept. 1. Vol. 45. No. 9. pp. 820–832. [24 refs.]

Four cases of hookworm infection in children are described having the usual characters. It appears that in 1934, 1935 and 1936 the numbers of infected persons detected in the Province of Naples were 33, 22 and 34. The diagnostic method is unmentioned and if it was the smear it is probable that adequate systematic examinations would display a considerable infection. The nomenclature used does not conform to the International Code. *C. L.*

CIMINO (Vincenzo). "Il segno della lingua" negli anchilostomiasici indigeni. [**The Tongue Sign in Indigenous Ankylostomiasis.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1937. Apr. Vol. 18. No. 4. pp. 196–199. With 1 coloured plate.

It is claimed that in Somaliland there has been found a new sign diagnostic of ankylostomiasis and consisting of a punctiform pigmentation of the tip and sides of the tongue, the colour being dark

bluish like that of Addison's disease, pernicious anaemia and arsenical poisoning. It is stated that examination of the faeces by an unstated method was accurate, and that judged by it infected persons had pigmented tongues and non-infected had not. [Many will doubtless reserve opinion on the rehabilitation of this discredited sign, until the means have been detailed which were used to distinguish infected from uninfected in an area described by Cimino as heavily infected, especially when they bear in mind what ASHFORD and KING wrote just over 30 years ago (*Jl. Amer. Med. Assoc.*, 1907, Vol. 49, p. 471). "Some writers have called attention to purplish spots on the tongue and have attached considerable importance to them as being distinctive of the disease. We have noted two kinds of discolouration: a rather diffuse smear generally on each side of the dorsum of the tongue, which apparently is due to venous engorgement and was not present in the majority of cases; and rather more frequently pigmented spots, 2 mm. to 4 mm. ($\frac{1}{12}$ to $\frac{1}{6}$ inch) in diameter, which were seen both on the tongue and the buccal mucous membrane. They were frequently noticed in persons of mixed race and could probably be found in other diseases."] *C. L.*

BONNE (C.). **Invasion of the Submucosa of the Human Small Intestine by** *Ancylostoma braziliense.*—*Amer. Jl. Trop. Med.* 1937. July. Vol. 17. No. 4. pp. 587–594. With 8 figs.

The report includes details of three instances already reported [this *Bulletin*, 1936, Vol. 33, p. 113] and of two more which are new. In one of the first cases the appearance of the cleaned and cleared mouth capsule showed the worm to be *A. braziliense.* In all five there were intestinal lesions with the same gross anatomy and histological picture.

The worms were found only incidentally in systematic histological studies of circumscribed haemorrhages in the jejunal submucosa, the largest being a few centimetres in diameter. The findings were these: (1) Eggs and larvae in the submucosa where there was haemorrhage with marked leucocytic infiltration mainly by eosinophils, destruction of tissue, an intact mucosa with no eggs or larvae on it, the patient being a Malay woman of 30 with purulent nephritis and cystitis, ulceration of the rectum and tuberculosis of the lung. (2) An immature worm, 0·3 mm. in diameter, whose sex was not determined, apparently because many of the worm sections had fallen out. It had a buccal capsule armed with large teeth. The patient, a Malay of 40, dying of peritonitis from a perforation proximal to a constriction 60 cm. from the pylorus, the walls of the hole showing plasma cells, eosinophils and oedema. (3) An adult worm with a maximum diameter of 0·6 mm. and many eggs and larvae in the submucosa in a Malay man who died of amoebiasis. (4) An adult worm with eggs and larvae in the submucosa of a Malay man of about 60 dying after operation for vesical calculus and having cystitis, pyelonephritis and prostatic abscess. (5) Three worms, two being immature females, the third the same or a male. Much tissue damage involving destruction at certain points of the circular coat and leucocyte infiltration of subserosa and submucosa. It is pointed out that presumably there was here straying of a parasite in a non-optimum host. *C. L.*

Ryo (Sai). **Investigations on Anemia caused by Ancylostomiasis. I. On the Blood Changes by Experimental Infection of** *A. duodenale.* **II. The Comparison of the Blood Changes before and after the Treatment. III. On the Egg Production of** *A. duodenale* **and** *N. americanus.* **IV. On the Blood Sucking Activities of** *A. caninum.* —*Jl. Oriental Med.* 1937. Sept. Vol. 27. No. 3. [In Japanese pp. 269–278. [18 refs.]; 279–286; 287–294. [22 refs.]; 295–302. English summaries pp. 24; 25; 26; 27.]

I. "The blood changes of three Manchurian volunteers experimentally infected with *A. duodenale* were carefully studied during 19 weeks after the infection. The conclusions are as follows:

"1. A droplet containing 300 larvae was laid on the skin of the upper extremity. The larvae which trespassed through the skin were 295, 292 and 291 respectively and the adult worms grown from them numbered 83, 78 and 77. The duration from the infection to the oviposition lasted 54, 55 and 57 days respectively.

"2. Eosinophilia was not recognized on the third day of infection but became obvious after one week and reached the highest point in the 6th–7th week, though the count decreased gradually after the 15th week. The erythrocyte count showed a moderate change after the 6th to 11th week of the infection and the amount of hemoglobin reduced very slightly after 5th to 6th week without indicating any change in the index. The reticulocyte increased in number after the third week of the infection.

"3. The eosinophilia caused by ancylostomiasis seems to be due to the metabolic products of the worms themselves, not to substances set free from the dead larvae, and the anemia seems to be very reasonably explained by the continuous bleeding.

II. "Blood pictures were studied in 20 cases of single and mixed infection of *A. duodenale* and *N. americanus.* The conclusions reached are as follows:

"1. The numerical relationship between the number of worms and the intensity of the anemia is not recognisable when worms harboured are less than 50.

"2. The anemia brought about by the infestation of fewer than 50 worms is moderate or very slight.

"3. The colour index does not alter, the reticulocyte is always visible and becomes more numerous when the anemia is intense. The maximal resistance of the erythrocytes to the salt solution tends to increase.

"4. The sedimentation rate of the erythrocytes usually accelerates.

"5. The function of bone marrow appears to accelerate and no paralytic phenomena at all were seen.

"6. The recovery of the blood from these changes is not complete until the 6th week of the treatment and recovery is remarkable if the anemia is severe.

"7. Anemia caused by ancylostomiasis is not similar to myeloparalysis but it resembles the anemia caused by continuous bleeding.

III. "The egg counting method has become useful in practice since Stoll's method was first published. The principle of this method is to calculate by direct means the eggs contained in a known quantity of feces. Wakeshima proposed a new method in 1932, in which the eggs are to be calculated indirectly by the numerical comparison with the eggs and the particles of lycopodium. As the author believes that this method is very simple and accurate, so he utilized it in the present study. The conclusions reached are as follows:

"1. Wakeshima's method is very useful in the practice of the egg counting of the helminths.

"2. *A. duodenale* lays about 10000–20000 eggs and *N. americanus* about 5000 eggs per day."

IV. "The blood sucking activities of *A. caninum* were measured by Wells originally in 1931 and the same sort of experiment was done by Nishi in 1933. They ascertained the possibility that a single worm sucks almost 1 cc. of blood per day. The author believes that this datum is a very important point in the argument regarding the truth of ancylostomiasis anemia.

"The following are the results obtained by the author who experimented in the same manner as Wells and Nishi did.

"1. The blood sucking activity was enormously affected by temperature. A temperature from 38°C. to 39°C. is most favourable and the female absorbs more blood than the male.

"2. Every worm ejects the blood rhythmically from the anus and blood amount expelled at one time is calculated at 0·149 cc. per day. The blood which issues from the place of attachment is about 0·235 cc. per day. Therefore the blood loss caused by habouring per worm is about 0·38 cc. per day. This figure should be multiplied 4 or 5 times when the worms are very vigorous.

"3. The blood loss caused by the attachment of the worms is not negligible in the etiology of ancylostomiasis anemia."

C. L.

LANDSBERG (J. W.). **The Reticulocyte Response in Acute Fatal Hookworm Anemia.**—*Amer. Jl. Hyg.* 1937. July. Vol. 26. No. 1. pp. 60–71. With 2 graphs. [19 refs.]

The anaemia was acute and posthaemorrhagic in character and was accompanied by a marked reticulocytosis which renders unlikely the theory of a myelotoxin inhibiting the activity of the bone marrow, at least in acute hookworm disease.

These experiments on dogs infected deliberately with *Ancylostoma caninum* fall into two series. In the first there was caused a fatal illness by the giving by mouth in a single dose to seven dogs of 1,060 to 10,680 larvae, or 147 to 1,187 per kilo. of body weight. The clinical and post-mortem findings were the same in all—progressive weakness, the passage of stools consisting essentially of blood and mucus, the refusal to feed; and after death pale mucous membranes [presumably present in visible parts during life], the small intestine showing large haemorrhagic areas and filled with blood and mucus. During life "there was in each case a progressive lowering of the erythrocyte and haemoglobin values reaching a minimum at the time of death"; there was no evidence of haemolysis (that is, no colouring of the serum), there was nucleation of erythrocytes, polychromatophilia and anisocytosis. Reticulocytes increased with wavelike fluctuations as the red cells and haemoglobin lessened and it is noteworthy that the reticulocyte response and the length of life of the dog were greater in adults than in pups. In three controls (litter mate dogs bled to death by five to nine bleedings amounting in all to from about a tenth to about a fifth of the body weight) there was the same reticulocytosis amounting at death to figures varying from 18 to 50 per cent. and the same progressive fall in red cells and haemoglobin.

In the second series a fatal hookworm infection was brought about after there had been in each of the two dogs an earlier reticulocytosis caused in one by a non-fatal infection and in the other by periodic bleedings, the blood picture having been allowed to return to normal before the fatal infection was induced. In both dogs a second marked reticulocytosis preceded death and it is concluded that inhibition of the marrow's activity could not have been the cause of the anaemia,

seeing that there was not only a reticulocytosis equally in all infected and all bled animals, but also a second reticulocytosis in the dog which had a second infection. [As to progressive anaemia after infection, the report on D938, Table I, is that in 8 days after infection the haemoglobin value had risen from an average of 8·2 gm. per 100 cc. before infection to a figure of 12·4 on that day. Regarding the inference that hookworm anaemia is not due to a lessened activity of bone marrow, resulting from a poison excreted by the worms, there is no doubt in preparation a report on the actual observed state of the bone marrow of these important sacrificial animals at the time they died.]

C. L.

SILVEIRA (Tacito) & DE MOURA CAMPOS (F. A.). Das trocas gazosas na ancylostomose. [**The Interchange of Gases in Ankylostomiasis.**] —*Hospital.* Rio de Janeiro. 1937. Aug. Vol. 12. No. 2. pp. 165–187. With 3 figs. [45 refs.] English summary.

The following is the substance of the author's summary.—

In this paper several problems connected with hookworm anaemia were considered. Basal metabolism was measured, and also O_2 capacity, cell count, colour index and CO_2 of the blood were determined. Haemoglobin was estimated by O_2 capacity figures. *p*H was calculated theoretically, according to Hasselbach's formula. The following conclusions were drawn :—

1. Basal metabolism range was from −9·1 to +13 per cent. of the predicted standards for people living in tropical countries.
2. Oxygen capacity of the blood ranged between 6·07 to 18·67 vol. per cent.
3. Haemoglobin estimated according to O_2 capacity figures varied between from 4·53 to 13·89 gm. per cent. These data correspond to 32·5 and 100 per cent. of the predicted standards. Corrections by Williamson-Harden and Appleton's table reduced these figures to 31·9 and 90 per cent.
4. Colour index calculated according to van Slyke's method oscillated from 0·28 to 1·22. In two instances it was higher than 1·0. Both referred to patients with very intense anaemia.
5. Total CO_2 of the blood range was observed from 38·36 to 59·16 vol. per cent.
6. CO_2 in solution ranged between 2·24 to 2·27 vol. per cent.
7. Combined CO_2 ranged between 36·11 to 57·90 vol. per cent.
8. *p*H varied between 7·30 to 7·51.

C. L.

COCKELL (W. C.). **Soil Sanitation.**—*Jl. Roy. San. Inst.* 1937. Nov. Vol. 58. No. 5. pp. 325–334. With 4 figs. [Summary appears also in *Bulletin of Hygiene.*]

The author of this paper is the Senior Sanitary Inspector of the Central Board of Health, Fiji, and he describes how the prevention of hookworm by means of the installation of sanitary latrines and prevention of soil pollution has been effected in Fiji.

The introduction of Indian labour into Fiji some 60 years ago was followed by a high mortality from hookworm, and in 1917, in co-operation with the Rockefeller Foundation, a campaign against hookworm, the frequency of which in some districts was as high as 96 per cent. of

the persons examined, was conducted. Another campaign was undertaken in 1922 and hookworm ceased to be a serious problem in 1927.

Illustrations are given of a standard type of latrine, which consists of an octagonal slab of concrete reinforced with $\frac{1}{4}$ inch mild steel bars and provided with a central opening 6 ins. × 14 ins. and a wooden block to fit the opening. Footrests raised $\frac{3}{8}$ inch above the surface of the slab are also provided for squatting purposes.

The borehole underneath the slab is sunk to a depth of 20 ft. wherever possible, but in some instances holes 12 ft. deep have been found to last for a considerable period.

The Central Board of Health has encouraged the construction of this standard type of latrine and has educated the native population on the advantages of its installation and maintenance by means of cinema films dealing with the dangers of hookworm infection and the fly danger.

Up to 1932 some 3,200 standard latrines had replaced the insanitary holes and box seats within a 15 mile radius of Suva, the capital of the Colony. At that date a further campaign was undertaken along with the Rockefeller Foundation with the object of providing borehole latrines in all Fijian villages as well as in Indian settlements, and up to the end of 1936 over 18,000 cement slab latrines had been completed.

The Central Board of Health has drawn up a standard septic tank design which is to be regarded as the minimum requirement for this type of installation. The tank has a minimum capacity of 200 gallons when used for not more than 8 persons and an increased capacity of 10 gallons for each additional person. The use of filter beds is not recommended in Fiji. The effluent from the septic tanks is disposed of by means of rubble drains or open channels carried well away from dwellings. *H. T. Calvert.*

PESSÔA (S. B.) & PASCALE (Humberto). Pesquisas sobre a ancylostomose em S. Paulo. II. Tratamento da ancylostomose pelo tetrachloretyleno. [**Treatment of Ankylostomiasis by Tetrachlorethylene.**]—*Ann. Paulist. Med. e Cirurg.* 1937. Nov. Vol. 34. No. 5. pp. 429–432, 435–439. [16 refs.]

A single dose of 4 cc. of tetrachlorethylene in gelatine capsules gets rid of about 95 per cent. of Necator.

Before considering tetrachlorethylene, and in connexion with SOPER's finding in Ecuador that deaths from carbon tetrachloride have been wrongly considered as due to yellow fever, the writers draw attention to a paper by Pessôa (*Rev. Med. de Pernambuco*, 1936) describing a similar case in a child of 12 who had been given 1·5 cc. of carbon tetrachloride. A discussion on the findings of other workers follows. The present report is on 51 persons, in 5 groups, who were treated first with tetrachlorethylene, then after an interval with carbon tetrachloride in an adult dose of 4 cc., the worms passed being collected separately after each treatment; 15 days after the second treatment the faeces were examined by Willis' technique and in these 51 cases no eggs were found. The whole number treated had been over 60. The value of the treatment is expressed, as it was by SCHÜFFNER and VERVOORT in 1913, as the percentage of all the worms collected which was found after the first treatment. The cases are described in 5 groups, their numbers, the dose of tetrachlorethylene

alone or combined, and the percentage of the total bag got after the first treatment. They are: Group I, 21 treated with 3 cc. of tetrachlorethylene and 88·2 per cent. of the total bag got after the first treatment; Group II, 8 treated with 4 cc. of tetrachlorethylene and 95·8 per cent. expelled by the first treatment; Group III, 8 treated with tetrachlorethylene 2 cc. and 0·75 cc. of oil of chenopodium with 91·7 per cent. expelled; Group IV, 9 children, of average age about 10 years, given 1·5 cc. of tetrachlorethylene and 0·25 cc. of oil of chenopodium in castor oil, and 17 per cent. of the recovered worms coming away with it; yet in Group V were 5 children, of average age about 9 years, who were given the same dose of tetrachlorethylene and oil of chenopodium but in water with a saline purge an hour later, and the percentage of the worm recovery by this was 70·2. Some 50 to 60 per cent. of the treated had giddiness, the drunken feeling coming on in more persons and with greater intensity than after the same doses of carbon tetrachloride. There have been given over 300 treatments with no accident except more or less pronounced giddiness. [The validity of the argument and conclusions rests on the assumption that Willis' technique will display all infections; for the poorer the technique in accuracy the higher cure rate will it give. On this point see the results of MAPLESTONE and MUKERJI below.] *C. L.*

MAPLESTONE (P. A.) & MUKERJI (A. K.). **Further Experience with Tetrachlorethylene.**—*Indian Med. Gaz.* 1937. Nov. Vol. 72. No. 11. pp. 650–652.

"The figures produced in this paper confirm the fact that our earlier result recording 62 per cent. of cures with tetrachlorethylene [this *Bulletin*, 1934, Vol. 31, p. 393] is much nearer the truth than our first results which were only 20·7 per cent. [this *Bulletin*, 1930, Vol. 27, p. 419] and an explanation of the apparent failure of the drug on this occasion is offered. Results of treatment of taenia and enterobius infections are also recorded."

The present work was on out-patients. Faecal examinations were by D.C.F., the writers continuing to be satisfied that the amount of egg reduction after treatment gives quite a wrong idea of a drug's efficacy, and holding, since one's aim should be unworming by one treatment, that diagnosis should be by the most accurate method available. The interval between treatment and re-examination was not less than 10 days and as the result of these re-examinations the treated are put into 4 classes—(1) Real cures where D.C.F. showed no eggs. (2) "Practical cures," including real cures and what may perhaps be called "near cures," those specimens in which D.C.F. showed "one or two" eggs and which were not held worth while to treat again. (3) Those persons not seen again. (4) Those who were still infected on re-examination and were re-treated.

Hookworm infection.—These persons fall into two nearly equal series. In the first, adult treatment was by 3 cc. of tetrachlorethylene, and 1 cc. of oil of chenopodium with an ascaridole content of 65 per cent.; it comprised 96 persons; after the first treatment the numbers in the four categories were respectively 43, 10, 12 and 31; after re-treatment the thirty-one were classed as 14, 6, 4 and 7; and after the third and last treatment the seven were classed as 4, 2 and 1; the percentage of known cures by one treatment was, then, 44·8, of known "practical cures" 55·2, and, if the 12 absentees fared in like manner, the presumed

absolute cures were 65·6 and practical cures 84·4 after two treatments.

In the second series 90 persons were treated with an adult dose of 4 cc. of tetrachlorethylene and the numbers in the four categories were 50, 11, 9 and 20; those of the 20 re-treated were 9, 2, 1 and 8; of the 8 treated a third and last time 6, 1 and 1; the percentage of known cures by one treatment was, then, 55·5, of known "practical cures" 67·7; after two treatments the figures were 70 and 85·5; and after 3 treatments 77·7 and 94·4.

Taenia infection.—The treated numbered 13, all in-patients; 4 passed heads in their 48-hour post-treatment stay in hospital, 6 had had no recurrence 3 to 5 months later, in 3 segments reappeared; in 2 the heads were of *T. saginata*, in 2 of *T. solium*, both of these latter being, however, experimental infections and the only instances of this tapeworm seen.

Trichuris infection.—The examinations regarding the effects of tetrachlorethylene were felt to be unsatisfactory, but the impression was that the drug was of little value.

Enterobius infection.—The cure rate based on washing the stools brought by patients is put as 90 per cent.

[On hookworm treatment the writers feel of the reviewer's comment on FAUST's paper [this *Bulletin*, 1937, Vol. 34, p. 455] that it "does not seem a fair statement of the case that when our work is cited as evidence of the value of tetrachlorethylene only the inferior figures are quoted." As an explanation of the finding of a lower anthelminthic value for tetrachlorethylene in gelatin capsules than out of them, Maplestone and Mukerji note that, 3 or 4 years after the experiment in which they gave the capsules, they found an overlooked tin with the capsules in it collapsed and empty, and they suggest that evaporation may have begun before the apparently full capsules had been used in their first test, in other words that they were not giving the full doses they had a right to think they were. The higher figure which the writers feel should have been mentioned [this *Bulletin*, 1934, Vol. 31, p. 393] referred to a mixture of tetrachlorethylene and oil of chenopodium. It could not rightly have been quoted in expressing disagreement with FAUST's statement that a cure rate of 90 per cent. is to be expected from tetrachlorethylene alone. The figures got by Maplestone and Mukerji were the only ones of which I knew, obtained by experienced and dependable workers who were using, as they themselves feel, the most dependable diagnostic method at present available. But in proportion as tetrachlorethylene is held safe does there remain a justification for leaving, if it can possibly be avoided, any infected person to be a spreader of infection on any scale?] *C. L.*

LEPROSY.

LEPROSY REVIEW. 1937. Oct. Vol. 8. No. 4. pp. 152–200. With 2 maps, 4 graphs & 8 figs. on 2 plates. Quarterly Publication of the British Empire Leprosy Relief Association, 131 Baker Street, London, W.1. [1*s.* 6*d.*]

The administration of the Uzuakoli Leper Colony in North Nigeria is described by T. F. DAVEY. During 1936 over 1,000 voluntary patients were accommodated, including many independent ones who contribute materially to the cost of their treatment. A mixture of hydnocarpus oil 25 per cent., its esters 50 per cent., with 12½ per cent. of codliver oil and 4 per cent. creosote in doses of 1 to 10 cc. is used by injection. All able-bodied patients are organized for agricultural and industrial work and also for games. The whole work is carried out at the cost of about £2,600, or under 50s. per head, and Dr. MUIR as the result of a visit regarded this as the best leper colony he has seen.

Leprosy infection of the nose is dealt with by Dr. M. OBERDOERFER, who examined 160 cases at the Itu Leper Colony in S. Nigeria. He found lesions in 62 per cent., mostly localized, especially on the anterior nasal septum. He discusses briefly previous theories, and suggests that this localization is due to the tendency to blood vessel ectasis predisposing to attack.

Mrs. RUSSELL contributes a note on the care and feeding of babies in leper colonies. *L. Rogers.*

DUPUY (L.). La situation endémique de la lèpre dans la région desservie par Foréami. [**Leprosy under Foreami.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. Sept. 30. Vol. 17. No. 3. pp. 323–330.

This paper records data regarding the distribution of leprosy in parts of the lower Belgian Congo. Surveys showed incidences of from 1·7 to 4·3 per mille with the unusual feature of a slightly higher rate among females. In accordance with the government policy, voluntary agricultural colonies, preferably under missionary administration with government subsidies, are recommended. *L. R.*

DIMITRY (T. J.). **Introduction of Leprosy into Louisiana, and the First Leper Hospitals.**—*New Orleans Med. & Surg. Jl.* 1937. Sept. Vol. 90. No. 3. pp. 113–119. With 2 figs. & 2 maps. [13 refs.]

This brief historical paper disputes the contention of BLANC and Isadore DYER that leprosy was introduced into Louisiana by French Acadians from New Brunswick, and puts forward the suggestion that it was brought by the colony founded by John Law in the early days of this State. In the discussion that followed neither view received much support and the slave trade was blamed. *L. R.*

PORTUGAL (Hildebrando). Notas epidemiológicas sôbre a lepra no distrito federal (1934 a 1936). [**Leprosy in the Federal District, Rio de Janeiro, 1934–36.**]—*Arquivos de Hig.* 1937. Nov. Vol. 7. No. 2. pp. 277–294. [16 refs.] English summary (7 lines).

This study is based on 873 cases. The heavier incidence was observed in those between 20 and 40 years, 39 per cent. of the total, 19·7 between 20 and 30 and 19·3 in the fourth decade. As regards sex, males and females were almost equal in 1934 (180 and 190 respectively), in the two subsequent years males predominated, 160 and

180 males to 74 and 133 females; altogether 54·5 to 45·5 per cent. Family contact was traceable in 11 per cent. and conjugal in 9·2. In 146 or 16·7 per cent. a history of contact with other lepers was given as the source of origin. The period of incubation was worked out in 59 cases and the average was almost 5 years (4 years 11 months 9 days). As regards the type of disease: In the Federal District proper, 582, or 66 per cent. of the whole were living, and cutaneous and mixed forms constituted 58·2 per cent. In the suburbs were 168 cases; of these, two-thirds were cutaneous and mixed, one-third the nervous type. In 123 the actual place of residence was not known; 53·3 per cent. of these were of the cutaneous or mixed type. *H. H. S.*

BROCCHIERI (Giulio). Su un caso di lepra autoctona in provincia di Roma. [**An Indigenous Case of Leprosy in Lazio, Roma Province.**] —*Policlinico.* Sez. Prat. 1938. Jan. 24. Vol. 45. No. 4. pp. 153–4, 157–8.

A woman of 46 years, born at Ferentino, had never been out of Italy, and had enjoyed good health until December, 1936 when she complained of pains in the right leg and small painless swellings on the legs, forearms and face. When seen 3 months later, she presented the leonine facies, pigmentation, and scattered nodules, Hansen's bacilli in the nasal secretion—in short, was suffering from leprosy of the mixed form. Her husband, whom she married 13 years before, had lived for the four years preceding the marriage in California, but he had never had any illness to note and even now shows no signs whatever of leprosy. It is unlikely, therefore, that the patient contracted the infection from him. There are a few cases, ten or so, in Lazio; peasants emigrate, especially from the Province of Frosinone, to Latin American States, and probably are responsible for introducing the disease on their return. The subject of this paper had not, so far as is known, any contact with such, but it is more than probable that there are unnotified cases one of whom might be the source of infection in this instance. Practitioners are urged to send to the Institute for Cutaneous Affections any patients exhibiting skin lesions of which there is any doubt. *H. H. S.*

CANAAN (T.). Statistisches und Geschichtliches ueber die Lepra in Palästina. [**Leprosy Incidence in Palestine.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1937. Nov. Vol. 41. No. 11. pp. 684–690. [Refs. in footnotes.]

This paper deals with the detailed distribution of leprosy cases in Palestine and is mainly of local interest. The leper asylum under Dr. Canaan has for long had accommodation for 100 to 120 cases. *L. R.*

i. BASUTOLAND: ANNUAL MEDICAL AND SANITARY REPORT, 1936 [DYKE (H. W.), P.M.O.]. Appendix IV. pp. 45–49.—**Report on the Botsabelo Leper Asylum, Basutoland, for the Year ending 31st December, 1936** [STRACHAN (P. D.), Supt.].

ii. ——. Appendix V. pp. 50–53.—**Report of a Survey of Leprosy in the Districts of Quthing and Qacha's Nek. November 14th–December 14th 1936** [GERMOND (R. C.), M.O. Leper Settlement, Botsabelo].

i. A fall in the patients in the Botsabelo Leper Asylum from 707 at the end of 1935 to 684 at the end of 1936 is due to satisfactory

decreased admissions and increased discharges, chiefly of convalescent patients, mainly of the neural type. The average age on admission was 36·5 years and the number of children under sixteen was under one-eighth of the total cases. The duration of the disease on admission according to the patient's statements was 1 to 12 months in 55 per cent., 13 to 24 months in 18·6 per cent. and in 25·6 per cent. it was over two years ; or much lower than in the Union of S. Africa. In addition there were 8,000 attendances at a daily dispensary. The intradermal treatment is popular, 65·5 per cent. of the patients accepting it. A Settlement Farm provided practically all the fresh vegetables and milk with great saving of expense.

ii. This is an instructive survey of the Quthing and Qacha's Nek districts from which the largest proportion of patients come, and they showed a rate of 3·2 per mille. Fortunately 90·5 per cent. were mild neural cases. A number of discharged patients were examined and the few recurrences found were of such a mild type as to be considered almost or quite negligible as regards infectivity. *L. R.*

EGYPT, MINISTRY OF THE INTERIOR. DEPARTMENT OF PUBLIC HEALTH. ENDEMIC DISEASES SECTION. EIGHTH ANNUAL REPORT 1935. [**Leprosy** pp. 5–6. With Tables 2 & 8.]

This report gives a brief account of the extensive Leprosy Colony at Abu Zaabal, where 10,000 square metres of land is available. Development is proceeding actively, trees and gardens planted and large quantities of vegetables grown by the inmates, who increased during 1935 from 159 to 237. In addition the available beds in the Cairo Leper Hospital have been increased to 75, mainly for female lepers. Further, 1,083 patients attended the leprosy units, with a total of 8,163 since the leprosy branch was opened, and 53·9 per cent. of the last years patients were positive ones. The number of sub-clinics for out-patients is being increased at no extra cost except travelling expenses. *L. R.*

SUDAN : REPORT OF THE SUDAN MEDICAL SERVICE FOR THE YEAR 1936. [**Leprosy** pp. 15–18.]

This report records further progress in the campaign against leprosy in the Sudan. In the Central Sudan new settlements formed near dispensaries have worked well and this system is being introduced on a large scale in the Nuba Mountain districts to provide observation and treatment for a large proportion of the infectious cases. In the most affected southern districts of the Equatorial Province the big and small settlements are functioning satisfactorily, and leprosy throughout the Sudan is well under control, but improved diet and standards of living will be necessary for its permanent eradication. *L. R.*

DO PATEO (Duarte) & PEREIRA (Solano). Da frequencia da lepra nos focos familiaes. Estudo epidemiologico. [**The Family as a Focus of Leprosy Infection.**]—*Brasil-Medico.* 1936. Dec. 5 & 12. Vol. 50. Nos. 49 & 50. pp. 1061–1075 ; 1080–1085. With 4 graphs.

With a view of estimating the part played by contact in the epidemiology of leprosy the authors analysed cases reported to them or examined by the health authorities and also the contacts—members

of the same families or those living in the same house—of lepers over a period of 9 years.

Of 9,239 reports sent in, 8,474 or 91·7 per cent., proved to be negative both by clinical and bacteriological examination, 456 (4·9 per cent.) showed clinical evidence of infection, 190 (2·1) were "suspicious" and 119 (1·3) were carriers of the organism but did not show clinical signs. Of 15,729 examined by the authorities 14,964 or 94·5 per cent. were clinically negative. Though the majority of the contacts who developed the disease showed signs within three years, in some cases the interval was five years and even more. The authors conclude that leprosy being largely a family or domiciliary infection for prophylaxis, weekly examination of contacts should be made in order that treatment may be started early, the only time at which it is likely to be successful, and that this examination should be made over a period of at least five years. *H. H. S.*

ROGERS (Leonard). The Epidemiology of Leprosy.—*Internat. Jl. Leprosy.* Manila. 1936. Oct.–Dec. Vol. 4. No. 4. pp. 469–484. [53 refs.]

BOENJAMIN (R.) & SOEDARSONO (R. M.). Een epidemiologisch lepra-onderzoek in dessa Tjigobang (Cheribon). [**Epidemiological Study of Leprosy in Tjigobang (Cheribon).**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Sept. 21. Vol. 77. No. 38. pp. 2266–2291. With 1 text fig. & 5 figs. on 2 plates.

CILENTO (Rafael). **Leprosy in Australia and its Dependencies.**—*Internat. Jl. Leprosy.* Manila. 1937. Jan.–Mar. Vol. 5. No. 1. pp. 45–52.

This paper gives a good account of the distribution and prophylaxis in Australia. The matter was discussed by the Federal Health Council in 1931 and arrangements made for a survey of the problem and the consideration of the methods of prophylaxis advocated by ROGERS. In the Mandated Territory of New Guinea approximately 500 cases have been confirmed bacteriologically, so the problem is a serious one there. In the British Solomon Islands an increasing number of cases are also being detected. An examination of contacts among the natives of Queensland revealed fifteen suspicious cases, some of whom have since been isolated at the Peel Island leprosarium. New South Wales reports 19 cases, 16 of whom are males. Attempts are being made to carry out periodic examination of contacts, but in the case of natives frequent movements and changes of name make it difficult, and the present "almost penal regulations" lead to hiding of such cases so that for the aboriginals only segregation is likely to be efficient, as they fear medical treatment so cannot be attracted by its provision. In view of the number of known lepers in Australian territories having increased from 80 to 167 since 1931 more adequate control is advocated through inquiries into the source of infection in all new cases, re-examination of contacts every six months for five years, careful records of the cases, improved treatment with probationary discharge of cases becoming negative bacteriologically, and attention to diet and occupation; all measures based on modern advances. The Commonwealth presents a unique opportunity for the study of the factors associated with the spread of leprosy. *L. R.*

RAMOS E SILVA (J.). Quatro licções sobre o diagnostico clinico da lepra. [**Lectures on the Clinical Diagnosis of Leprosy.**]—*Brasil-Medico.* 1937. Nov. 6, 13, 20 & 27. Vol. 51. Nos. 45, 46, 47 & 48. pp. 1127–1130; 1147–1153; 1163–1166; 1185–1188. With 13 figs.

This series of four lectures was part of a University Extension course organized by the Centro Internacional de Leprologia. Although they do not bring forward any new matter—they did not profess to—they are mentioned here because of the excellent presentation of the position and of the points with which they were intended to deal. In the first the fundamental diagnostic data are stated and stress is laid on the importance of early recognition of the disease. In the second the special diagnostic points between leprosy and tuberculosis and syphilis. The third is equally important and considers in detail the distinctions between leprosy in its various forms and other dermatological affections and syndromes; in the fourth, the diagnosis of concomitant conditions. The lectures are illustrated with good reproductions of clinical cases showing the lesions referred to in the text.

H. H. S.

JUNIOR (João Moraes). O metabolismo basal na lepra. [**Basal Metabolism in Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1937. Sept. Vol. 5. No. 3. pp. 287–317. With 1 chart. English summary (6 lines).

The author prefaces the subject of the title of this article by references to basal metabolism in other conditions such as diseases of the digestive, circulatory, respiratory and nervous systems. The apparatus employed was Benedict's as modified by Roth. The tests were carried out on thirty-five patients in the morning, before food, divided into three groups: I. Fifteen quiescent cases; II. Ten in a leprotic reaction; III. Ten who had never had a leprotic reaction. Short note is made on each patient and the author concludes that basal metabolism is always increased in this disease even when no special cause, beyond the lepra infection generally, can be discovered; he found the rate increased by the leprotic reaction. In quiescent cases the rate falls and tends to the normal limits. *H. H. S.*

MITSUDA (Kensuke) & NAGAI (Kenji). **On Alopecia Leprosa.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 247–252. With 6 figs. on 1 plate.

The unusual frequency of alopecia in leprosy in Japan is further discussed in this paper. Two kinds are recognized, one occurring in nodular cutaneous and one in macular neural cases, only the former being here dealt with. Both the cases first studied by Mitsuda at the Zensei hospital in 1911 and a larger group collected by Nagai among less advanced patients at Nagai are analysed, the condition having been found in 68·1 per cent. of 1,051 nodular cases. The loss of hair is seen chiefly over the course of the larger veins, but it persists for long over the arteries. This is attributed to the low pressure and slow velocity of the veins, and the abundance of perivascular lymph spaces around them, producing more suitable conditions for the

development of leprous infiltration, the pressure of which around the hair papillae causes malnutrition and atrophy of the hair roots. Photos illustrate the condition. *L. R.*

WADE (H. W.) & FRASER (N. D.). **The Skin Lesions of Neural Leprosy. III. Observations in China.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 285–308. With 34 figs. on 6 plates.

The authors report the results of microscopical examinations of leprides from 31 typical cases of leprosy in China on the lines of their former work in other countries, in all of which tuberculoid changes in some degree were found. Clinically such lesions were met with in 23 of 225 cases examined. The major changes occurred in males and minor in females. Superficial atrophy of the skin was not found to indicate a retrogressed lesion. Enlargement of cutaneous nerves was found in some major tuberculoid cases, and polyneuritic changes were sometimes noted. Certain patients improved markedly under treatment in spite of irregular attendance. *L. R.*

TISSEUIL (J.). Sur une forme tuberculoide d'accident primitif de la lèpre. [**Primitive Tuberculoid Lesions.**]—*Bull. Soc. Path. Exot.* 1937. Nov. 10. Vol. 30. No. 9. pp. 757–760. With 1 fig.

This is a brief description of four cases in which a small tuberculoid lesion was considered to be a primary one and possibly the site of infection. Four were in girls and one in a boy, aged from 2 to 7 years. The lesions were small prominent raised red patches with a tuberculoid structure on section, in two of which cicatrization was commencing in the centre. They are thought to be primary leprous chancres.

L. R.

FERNÁNDEZ (José M. M.). La reacción leprosa tuberculoide. [**The Tuberculoid Leprous Reaction.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1937. Dec. Vol. 5. No. 4. pp. 419–463. With 35 figs. [17 refs.] English summary.

The author has studied in no little detail the tuberculoid leprous reaction in twelve cases. He describes the condition from the clinical, bacteriological and histological aspects. The evolution of the reaction is subacute without general systemic disturbance. Old lesions become congested and inflamed and new lesions may appear with bacilli. As the reaction diminishes, the bacilli usually increase ; this was observed in ten of the twelve described, and after subsidence of the reaction atrophic maculae remain. The leprotic test was positive in all and the corpuscle sedimentation rate low.

In the acute stage there is intense tissue reaction, with lymphocytic infiltration and presence of numerous epithelioid cells. Later, in subsidence, fibroblasts are numerous and small foci of necrosis are seen, but no development into local nodules. The reaction is, says the author, an allergic phenomenon the result of invasion of sensitized tissues by the bacillus or its toxins. The prognosis is favourable. Special treatment is as a rule not required, as pain and fever are absent.

Each of the twelve cases is described in detail and the article is illustrated by good photographs of some of the patients and photomicrographs of the histological changes. *H. H. S.*

RABELLO, Jr. **A Clinico-Epidemiological Classification of the Forms of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 343–356.

The author discusses this question on account of the strong movement against the classification adopted by the Manila conference of 1931. His own suggestion, with a comparison with that of LIE, is as follows :—

Lie's Classification.		Our Classification.	
Principal forms	T (Tuberous) M (Macular) N (Nervous)	Principal forms	L (Lepromatous) M (Macular) A (Tropho-anesthetic) T (Tuberculoid)

Complex forms : Combinations of the above forms (the most frequent being LA and MA).

Other symbols : +, bacteriologically positive ; —, bacteriologically negative ; 1, primary ; 2, secondary. *L. R.*

WADE (H. W.). **A Proposed Revision of the Memorial Conference Classification of Leprosy.**—*Amer. Jl. Trop. Med.* 1937. Nov. Vol. 17. No. 6. pp. 773–801. [39 refs.]

This lengthy paper discusses a number of classifications of leprous lesions, including that of RABELLO above. It should be consulted by those interested in the original as it cannot well be summarized.

L. R.

GERMOND (R. C.). The Classification of Leprosy.—*Internat. Jl. Leprosy.* Manila. 1937. Jan.–Mar. Vol. 5. No. 1. pp. 67–70. With 1 fig.

i. DUBOIS (A.), DUPONT (Adolphe), CONZEMIUS (E.) & DEGOTTE (J.). L'histodiagnostic dans le dépistage de la lèpre débutante. [**Histodiagnosis.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. Sept. 30. Vol. 17. No. 3. pp. 307–322. [14 refs.]

ii. VAN BREUSEGHEM (R.). Contribution à l'étude du diagnostic de la lèpre : la ponction glanglionnaire. [**Gland Puncture Diagnosis.**]—*Ibid.* pp. 375–378.

iii. ——. Contribution à l'étude du diagnostic de la lèpre : les troubles de la sudation. [**Sweating in Diagnosis.**]—*Ibid.* pp. 381–384. With 2 figs. on 1 plate.

iv. CHATTERJI (S. N.). **Routine Examination to Diagnose Leprosy.**—*Med. Bull.* Bombay. 1937. Sept. 4. Vol. 5. No. 17. pp. 541–543.

v. LOWE (J.) & DHARMENDRA. **Sternum Puncture in Leprosy. A Study of Fifty Cases.**—*Leprosy in India.* 1937. Oct. Vol. 9. No. 4. pp. 121–123.

These five papers deal with various aids to diagnosis.

i. The authors discuss the value of histological examinations of the early lesions of leprosy in making a diagnosis in doubtful cases. From

the examination of 26 definite and 50 suspected leprosy cases they conclude that like other methods it does not furnish certain results in all cases, for the characteristic tuberculo-sarcoid changes are not always found. The possibility of confusion with tertiary yaws must be borne in mind, but the method is still of value in bacteriologically negative cases.

ii. The author punctured the inguinal glands and stained the material obtained for acid-fast bacilli and granules. In nodular cases large numbers of bacilli typical of Hansen's were always found, but they are readily recognized without gland puncture. Of more interest are the maculo-nerve cases, including 61 treated and 42 untreated, together with 95 non-leper controls, with 73·7 per cent., 64·2 per cent. and 49·4 per cent. respectively with negative results, so this method proved to be of no diagnostic value in nerve cases of leprosy.

iii. The author discusses the value of determining the loss of the power to secrete sweat in affected skin in nerve cases of leprosy. After discussing the methods used for eliciting this sign he rejects the use of pilocarpine as not without danger and adopts that of Jurgensen-Milnor. This consists in drying the skin to be tested with cotton wool, applying a layer of Tr. Iodine, letting this dry and then sprinkling the area with starch. On provoking sweating by light exercise the starch becomes blue in the presence of the iodine, and the absence of this change in colour will reveal the loss of sweating power of affected skin. Out of 111 cases so tested the reaction was positive in 79, or 71 per cent.

iv. This is a general discussion of diagnostic method with nothing new in it.

v. The authors report on fifty cases in which material obtained by puncture of the sternum was examined for acid-fast bacilli in view of the frequency of the invasion of the reticulo-endothelial elements. Lepra bacilli have been found in the bone marrow by previous workers, especially in nodular cases, and the authors had confirmed this in a few post-mortems on leprosy subjects. Sternal puncture was therefore adopted as a clinical method with the following results. Of 32 cutaneous cases 16 were positive, in all of which the skin of various parts of the body was also positive, including that over the sternum in 15, but in most of these the bacilli were more scanty in the skin than in the sternal marrow, so 50 per cent. were considered to be positive on sternal puncture. Of 18 nerve cases, however, only one was positive with numerous bacilli, but none in the presternal skin. They suggest that it would be of interest to determine if the bacilli remain in the bone marrow after the infection of the skin has died out, as this might be a possible source of relapses. *L. R.*

CLOUSTON (Thomas M.). **Children of Lepers at Nauru.**—*Internat. Jl. Leprosy.* Manila. 1936. Oct.–Dec. Vol. 4. No. 4. pp. 437–440.

This paper supplements the scanty available information on the after-history of children born to lepers, but separated as a rule at once from their parents. It deals with 43 children born to positive leper mothers in the Nauru Island segregation camp. The mortality was rather above the average for the island, with 9 deaths (21 per cent.), 5 of them under 12 months of age. Of the 34 survivors ten are deducted as under 3 years of age, so unlikely yet to show infection, and of the remaining 24, five, 20 per cent., have developed the disease, three of them

in an infectious form, who were segregated at 9, 7 and 4 years of age respectively, but one has been released after three years' treatment. Two other slight nerve cases are being watched. Owing to the great prevalence of leprosy on the island it is not possible to be sure that there was no exposure of these children to infection. Three of them had bad family histories, so may have been predisposed to the disease. *L. R.*

i. SALLE (A. J.) & MOSER (J. R.). **Bacteriology of Leprosy. V. Further Isolation Results.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 253–258.

ii. MCKINLEY (Earl B.) & DE LEON (Walfrido). **Mass Cultivation of** *Mycobacterium leprae.*—*Ibid.* pp. 259–266. With 2 plates. [18 refs.]

These two important papers afford confirmation of the cultivation of leprosy bacillus by McKinley and Soule (1932).

i. Salle and Moser have worked in the U.S.A. Carville leper settlement using a culture medium of glycerine veal agar slants, with the addition of embryonic chick tissue and minced chick embryo media, and have also used glycerine veal agar in the gas environment of McKinley. Nodules removed aseptically from patients and minced were used for inoculating the culture tubes, and positive growth was obtained in 190 out of 311 inoculated tubes and flasks, including nodules from every one of the eleven patients tested. Both acid-fast and non acid-fast rods were always obtained, the former being most numerous in young cultures, and sub-cultures were readily made, but became progressively fewer with the increasing age of the cultures, and on transfer to a new medium acid-fast bacilli again preponderated at first. Both morphologically and in their staining properties the organisms were similar to those previously obtained in Honolulu, and thus afford confirmation of the earlier work.

ii. The cultures described in 1931 by McKinley and SOULE have now been carried through sixty generations without showing more luxuriant growth, and they differ in this from all previously described lepra bacilli. The principle of the culture method was based on WHERRY's attempts to grow it in an atmosphere of oxygen and carbon dioxide in 1930. The most successful medium was found to be hormone-glycerol-agar, the preparation of which is given in this paper, the main purpose of which is to describe a gas tension incubator for mass culture with a view to chemical investigations of the bacilli to allow of fractionation in the hope of finding a protein fraction for employment as an antigen, which may be of value for use in an intradermal diagnostic test. This apparatus, for the details of which the original paper should be consulted, will contain 2,880 culture tubes. A glass chamber to facilitate aseptic handling of the nodules for inoculation is also described. *L. R.*

HENDERSON (Howard J.). **A Serological Comparison of the Proteins of Various Strains of Supposed Leprosy Bacilli and Other Acid-fast Bacteria.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 267–275. With 2 figs. [14 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Sixteen strains of chromogenic or non-chromogenic acid-fast bacilli isolated from leprosy were grown in Long's synthetic medium for 8 weeks. The culture fluids were filtered, phenolized and concentrated.

An antiserum was prepared for each strain by injection of rabbits, and cross-precipitation tests were put up. Of the 15 strains, 13 exhibited a group affinity, though each strain reacted most strongly with its own antiserum. Comparisons were then made with other well-known acid-fast bacilli. A group relationship was found between the main group of "leprosy" bacilli and *Myco. phlei*; between Duval's non-chromogenic "leprosy" bacillus and the avian tubercle bacillus; between Karlinski's "leprosy" bacillus and the human tubercle bacillus; and between the Levy-Kedrowsky "leprosy" bacillus and *Myco. smegmatis.* *G. S. Wilson.*

DUBOIS (A.), GAVRILOV (W.) & FESTER (A.). La bacillémie chez les lépreux comme méthode de culture et comme méthode de diagnostic. [**Bacillaemia in Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. June 30. Vol. 17. No. 2. pp. 169–175.

DUBOIS (A.). La démonstration du bacille de Hansen dans les coupes histologiques. [**Demonstration of** *Mycobacterium leprae* **in Tissues.**]—*Ann. Soc. Belge de Méd. Trop.* 1937. June 30. Vol. 17. No. 2. pp. 291–296.

LOWE (John) & DHARMENDRA. **A Study of** *M. leprae muris* **in Tissue Cultures and in Chick-Embryo Medium.**—*Indian Jl. Med. Res.* 1937. Oct. Vol. 25. No. 2. pp. 329–339. [27 refs.]

These workers record three years' attempts to cultivate the bacillus of rat leprosy in tissue cultures, including minced chick-embryo medium, but they failed to demonstrate any multiplication of the inoculated bacilli or change of them into non acid-fast ones. They were thus unable to confirm the work of MCKINLEY, VEDER, SOULE and SALLE. *L. R.*

i. BALFOUR-JONES (S. E. B.). **The Experimental Transmission of Rat Leprosy to the Golden Hamster** (*Cricetus auratus*).—*Jl. Path. & Bact.* 1937. Nov. Vol. 45. No. 3. pp. 739–744. [11 refs.]

ii. ADLER (S.). **Inoculation of Human Leprosy into Syrian Hamster.** [Correspondence.]—*Lancet.* 1937. Sept. 18. pp. 714–715.

iii. LAIDLAW (P. P.). **Inoculation of Human Leprosy into Syrian Hamster.** [Correspondence.]—*Ibid.* Sept. 25. p. 773.

These important papers record the discovery of an animal that can readily be infected by inoculation with human and rat lepra bacilli.

i. After confirming the susceptibility of the golden or Syrian hamster, *Cricetus auratus*, to inoculated human and bovine tubercle bacilli, the author proceeded to inoculate these animals, both intraperitoneally and subcutaneously with saline suspensions of fresh material from a rat infested with rat leprosy. He obtained extensive infection of the liver, spleen, glands, and in some cases also of the lungs and kidneys, with numerous acid-fast bacilli in the lesions indistinguishable from those of rat leprosy. The disease was also carried on to further animals by inoculation, leaving no doubt regarding positive results having been obtained.

ii. As the result of a suggestion of Sir Patrick Laidlaw, Adler has carried out intraperitoneal inoculation of the Syrian hamster (*Cricetus*

auratus), which has the advantage of breeding in captivity, with aseptically removed human leprous nodules containing very numerous acid-fast bacilli. Positive results were obtained in three out of four previously splenectomized hamsters, for nodules in the animals contained much more numerous lepra bacilli than had been injected, showing multiplication in the system, and they were also found in liver smears from one, indicating generalization of the infection. All three animals showed heavy infections, within six weeks of inoculation. The fourth was found dead and unfortunately putrefaction was too far advanced to allow of examination.

iii. Sir Patrick Laidlaw writes to point out that to BALFOUR-JONES is due the credit of first infecting hamsters with rat lepra bacilli, for he demonstrated sections of infected hamsters before the Royal Society of Medicine on March 3rd, and before the International Congress for Microbiology on July 29th, both in 1936. *L. R.*

NAKAJYO (Suketoshi) & SUZUKI (Risshun). Ueber die Züchtung von Tuberkelbazillen aus den Auswürfen von Leprösen. [**Cultivation of Tubercle Bacilli in Lepers.**]—*Tohoku Jl. Experim. Med.* 1937. Aug. 31. Vol. 31. No. 5. pp. 431–436. [12 refs.]

The authors report on the examination of the sputum of 100 cases of leprosy for tubercle bacilli. In 30 cases positive results were obtained. In a number of sputa containing acid-fast bacilli none could be grown. In positive cases a longer time was required for the growth of tubercle bacilli than in the purely tuberculous cases.

L. R.

ANDERSON (R. J.), REEVES (R. E) & CROWDER (J. A.). **The Chemistry of the Lipids of Tubercle Bacilli. LII. The Composition of the Acetone-Soluble Fat of** *Bacillus leprae*.—*Jl. Biol. Chem.* 1937. Nov. Vol. 121. No. 2. pp. 669–684. [10 refs.]

This technical chemical paper is best summarized in the authors' own words:—

" 1. An investigation has been made of the chemical composition of the acetone-soluble fat of *Bacillus leprae*.

" 2. The crude fat was found to be a complex mixture of free fatty acids and neutral fat.

" 3. The neutral fat consisted apparently of fatty acid esters of the disaccharide trehalose. No glycerol could be found.

" 4. The fatty acids were composed of ordinary solid saturated acids, unsaturated solid acids, unsaturated liquid acids, and saturated, optically active, branched chain acids.

" 5. Three different substances possessing phenolic properties were isolated.

" 6. The ordinary saturated fatty acids were represented by caproic, myristic, palmitic, stearic, arachidic, behenic, and tetracosanoic acids. Certain new optically active higher acids were also present but could not be definitely identified.

" 7. Among the unsaturated acids examples of C_{14}, C_{16}, C_{18}, C_{20}, C_{22}, and apparently C_{21} and C_{25} were found.

" 8. A series of new dextrorotatory, branched chain, saturated acids apparently of the C_{16}, C_{19}, and C_{22} series was isolated."

L. R.

FICKER (Martin). Methoden der Komplementbindung und Flockung bei Lepra. [**Complement Fixation and Flocculation.**]—*Arch. f. Hyg. u. Bakt.* 1937. Vol. 118. No. 5/6. pp. 362–368.

This paper deals with the technique of the preparation of antigens from lepromata of rats and man, from acid-fast bacilli cultivated from man, and thirdly from other acid-fast bacilli. It contains nothing new.

L. R.

MONTHLY BULLETIN OF THE BUREAU OF HEALTH. Manila. 1937. July. Vol. 17. No. 7. pp. 265–275.—**Summary Report on Antigenic Skin Tests in Leprosy.**

This is the report of a Philippine Commission on an elaborate series of intradermal skin tests with various bacteriological products with a view to finding a reliable diagnostic method, and at the same time to determine if any one of the bacteria from which the products were derived is likely to prove to be the causative organism of leprosy. The substances tested include protein, polysaccharide, phosphatide, leprosin (wax) and leprosinic acid derived in Dr. Anderson's U.S.A. laboratory from laboratory strain No. 370 of the so-called *M. leprae* isolated from a case of leprosy in Honolulu about 1909. Also antigens of tuberculin protein trichloracetic acid precipitated from a group of acid-fast bacilli, some of which are suspected to be strains of *M. leprae*, all prepared by Dr. Long ; as well as similar preparations from different types of tubercle bacilli and other acid fast organisms, including those of Duval, Daines and Karlinski derived from leprosy cases. Some of these various acid-fast organisms show cross serological reactions indicating affinity between them. The supposed leprosy strains of McKinley and Soule were also included, the first named being a member of the commission.

A total of 5,174 skin tests were carried out with products from suspected leprosy organisms, and also over 4,000 with those of the tubercle bacillus, and in no case did the positive reactions in leprosy patients exceed the negative ones. The conclusions are therefore negative, but the commission feel that the tests cover the now existing possibilities and so clear the ground for work on new lines. *L. R.*

WOODMAN (H. M.). **Some Results of Treatment of Leprosy in the Southern Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1937. Apr. 19. Vol. 30. No. 6. pp. 631–638. [10 refs.]

This paper summarizes the results of the modern treatment of leprosy over a period of six years in the largest leprosarium in Africa with 3,500 cases. The conclusions are best given in the author's own words :—

" Definite evidence is given in favour of treatment with chaulmoogra derivatives over a period of 3 to 4 years.

" After this period further treatment appears to be of little or no avail except in special cases.

" A big proportion of early cases become arrested without interference but are assisted to do so by treatment.

" No method of treatment so far employed holds out much prospect for the advanced C3 cases whose destiny, when they survive, is generally the maimed and disabled N2 stage.

"The settlements are effective in removing the chief foci of infection from the district and in centralizing and simplifying the control of cases.

"In spite of the great incidence of leprosy it is important to note that only 10 per cent. of cases are any danger to their neighbours, as far as can be at present judged in the absence of repeated and exhaustive laboratory examinations." *L. R.*

SCHLOSSBERGER (H.). Chaulmoograöl und Verwandtes. [**Chaulmoogra Oil and its Allies.**]—Reprinted from *Handbuch der Experimentellen Pharmakologie.* Vol. 5. 127 pp. With 1 fig. [Numerous refs.]

This is an adequate and comprehensive account of the history, botany, chemistry and therapeutical applications of the anti-leprotic oils obtained from the seeds of a large number of species belonging to a few genera in the botanical family Flacourtiaceae. The best known of these oils are chaulmoogra, hydnocarpus and sapucainha, which are widely used as such, or in the form of sodium salts (soaps) or ethyl esters of the fatty acids, but there are a considerable number of other less known oils, belonging to the same group, the use of which is sometimes advocated in the areas in which they are found, mainly from motives of economy or local interest. The constants of a large number of these oils are known and Dr. Schlossberger has rendered no small service in bringing together in this monograph a vast amount of botanical and chemical information concerning them from sources not readily accessible.

The pure chemistry of chaulmoogric and hydnocarpic acids, the constituents to which these oils owe their therapeutic value, also receives adequate attention, and a particularly interesting account is given of the derivatives and allies of these acids, which have been synthesized but which have so far not proved to be of special therapeutic value.

Two-thirds of the monograph deals with therapeutic applications. No less than 20 pages are devoted to describing the mixtures, derivatives and proprietary preparations which the ingenuity of leprologists and chemists has evolved from these comparatively simple drugs. Copious references to clinical trials conducted with most of these things are also provided. This section is followed by chapters on the bactericidal action of these drugs, and on various aspects of their pharmacology, on which a surprising amount of work has been done.

The monograph is a tribute to Dr. Schlossberger's patience and industry and to his remarkable gift for extracting the essentials from a mass of literature and presenting it in concise and illuminating form.

T. A. Henry.

COLE (Howard Irving) & CARDOSO (Humberto). **Relation of Irritation to Method of Manufacture of Ethyl Esters of Chaulmoogra Oils.**—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 277–283. With 1 fig.

The authors report the results of an investigation to find the method of making the least irritating esters of *Hydnocarpus wightiana* oil. They have found that the irritant effect of their injections is due

mainly to decomposition of the esters on standing for long. This can be reduced most by neutralization, and also by blowing out with steam for two hours to remove volatile impurities, filtering and drying. The addition of iodine or 4 per cent. creosote is also essential. The best result was obtained by using both neutralization and blowing out with steam. There is not much variation in irritant effects of esters prepared by the Culion 48 or 8 hour method of esterification and by the cold sunlight method. *L. R.*

ROY (A. T.). **Apparatus for Leprosy Clinic.**—*Indian Med. Gaz.* 1937. Sept. Vol. 72. No. 9. pp. 544–545. With 3 figs.

This is a short paper describing and illustrating apparatus for keeping hydnocarpus oil at a constant temperature, from which it can be drawn into syringes for injection. *L. R.*

PAGET (Humphrey). **The Liquid Acids of Sapucainha Oil.**—Reprinted from *Jl. Chem. Soc.* 1937. June. pp. 955–960.

This is a highly technical paper dealing with the oil of *Carpotroche brasiliensis* used in the treatment of leprosy in Brazil, which contains the characteristic chaulmoogric and hydnocarpic acids, and also a considerable liquid fraction which is the object of this research. It should be read in the original by those interested. *L. R.*

LOWE (J.) & CHATTERJI (S. N.). **Experiments in the Treatment of the Trophic Lesions of Leprosy by Injections of Hydnocarpus Preparations.**—*Leprosy in India.* 1937. Oct. Vol. 9. No. 4. pp. 115–120. With 18 figs. (16 on 8 plates).

This paper deals with the treatment of such trophic lesions as ulcers on the sole of the foot, ulnar paralysis leading to claw hand, paralysis of cranial nerves leading to eye troubles and foot-drop due to peroneal paralysis, and it is illustrated by photos of cases. The foot ulcers are associated with leprous infiltration of the tibial nerve at the ankle, so hydnocarpus injections were given along the course of that nerve in addition to intradermal and subcutaneous ones around the ulcers. Fifteen such cases were treated for a year with reduction of the pain and healing of seven, even where necrosis of bone was still to be detected by crepitus, and in the other eight the ulcers were smaller. Surgical decapsulation of thickened tibial nerves only reduced the pain without inducing healing. Improvement was obtained by similar injections in some cases of paralysis of other nerves, and it is considered that the method described is worthy of further trial. *L. R.*

MARCHOUX (E.) & CHORINE (V.). Traitement de la lèpre par le tellure. [**Tellurium in the Treatment of Leprosy.**]—*Bull. Acad. Méd.* 1937. July 20. 101st Year. 3rd Ser. Vol. 118. No. 27. pp. 86–93.

This is an important investigation of the action of tellurium in the control of rat leprosy infections. The pure metal was suspended in oil or in serum glucose, and sodium tellurite has also been used. The injection of the metal in small easily borne doses, such as 0·04 gramme in four doses, before infection with rat leprosy retards the development

of the disease. When given after infection the result depends on the mode of infection, for when the rapid and extensive infections are induced by intraperitoneal injection of infective material the disease develops much more slowly and with more localised unprogressive lesions than in control animals with inhibition of the growth of the causative bacilli, although their subsequent injection into fresh animals shows that the rat leprosy bacillus in the tissues is not killed by the drug but its vitality is diminished. Two leprous patients have been treated by tellurium with apparently beneficial results, but the improvement did not persist long after the drug was discontinued. Some greyish discolouration of the skin, and an alliacious odour are produced by the treatment, further trials of which will be awaited with interest. *L. R.*

TISSEUIL (J.). Le synthol soufré dans le traitement des ulcères de la lèpre nerveuse. [**Synthol soufre in Leprous Ulcers.**]—*Bull. Soc. Path. Exot.* 1937. Nov. 10. Vol. 30. No. 9. pp. 755–757.

The author reports on the treatment of four cases of perforated ulcers by intravenous injections of this preparation of sulphur in 1 cm. doses twice a week up to 10 to 20 doses. He obtained general amelioration of the disease, together with an arrest of the suppurative process and of the putridity, and cicatrisation in most of the ulcers.

L. R.

FLORIANI (Luis) & FLORIANI (Carlos). Nuevo tratamiento de la lepra, en especial de las úlceras leprosas. [**New Form of Treatment of Leprosy, in particular Leprotic Ulcers.**]—*Prensa Méd. Argentina.* 1937. Aug. 4. Vol. 24. No. 31. pp. 1509–1535. With 15 figs.

In Upper Paraguay and the Chaco people use the bark of *Aspidosperma quirandy* in powder for treating ulcers and wounds ; in Bolivia and Matto Grosso, Brazil, urucú or *Bixa orellana* is used as an oily preparation for the local treatment of leprous lesions. The authors have carried out tests with another species of Aspidosperma, *A. polyneuron*, one of the Apocynaceae which is found in Misiones (Argentine), Brazil and Paraguay. The bark contains seven alkaloids : aspidospermine, aspidosamine, aspidospermatine, quebrachine, hydroquebrachine, quebrachamine, and aspidospermicine. The formula of each is given in the article.

At first the authors used 2 per cent. solutions of the last for injection, but the results were unsatisfying and 2·5 per cent. aqueous solution of all the alkaloids was substituted. Injections of 2–5 cc. were given twice a week. Detailed notes are given of fifteen cases treated by these injections intramuscularly. Within a month improvement was noticeable ; quite marked in two months and in some cases in three months the ulcers were cicatrized. Others took a little longer. Others, again, were given urucú. The former, *Aspidosperma polyneuron*, gave better results than the *Bixa orellana* preparation in cases with ulcers, but its action on other lesions was less marked. Both drugs are advised for inclusion in the armamentarium against leprosy. The article is illustrated by photographs showing the conditions of ulcers before and after treatment [see this *Bulletin*, 1925, Vol. 22, p. 578].

H. H. S.

VIGNE, VIDAL & LOMBARD. Maladie de Hansen érythématocircinée : grosse amélioration par la cryothérapie. [**Treatment of Leprosy by Cryotherapy.**]—*Marseille-Méd.* 1936. Dec. 5. Vol. 73. No. 34. pp. 614–619. With 2 figs.

This is a brief note on a case with extensive rose coloured annular plaques, in which after previous use of methylene blue and of hyrganol iodide, carbonic acid snow was applied to the lesions at ten-day intervals with apparent benefit. *L. R.*

PEREIRA (Octaviano de Loiola). A vacina de Vaudremer na lepra. [**Vaudremer's Vaccine in the Treatment of Leprosy.**]—*Bol. Geral Med. e Farm.* 1937. Aug. & Sept. Ser. 19. Nos. 8 & 9. pp. 230–237.

Vaudremer's vaccine consists of short bacilli cultivated from leprosy nodules for three weeks on glycerin potato and lysed in physiological saline. It was administered subcutaneously, beginning with 0·25 cc. twice a week and increasing gradually till a 2 cc. dose is reached, when the injection is made once a week ; the dose of 2 cc. is never exceeded. After an interval the injections are again resumed. The results in eleven cases are analysed ; in no instance was any febrile reaction produced and the injections were well tolerated. Some patients appeared to benefit, in particular those with oedematous infiltration of the hands and feet with rise of temperature and general debility. Early nervous lesions seemed to improve ; in ocular cases great caution is needed, as they may become worse under the treatment. The vaccine has no effect on leprotic nodules, nor any definite action on "ulcerative lesions, neuralgias and sensory disturbances." [See this *Bulletin*, 1935, Vol. 32, p. 342.] *H. H. S.*

DE MELLO (Froilano) & PEREIRA (O. Loyola). Observations résumées du traitement de quelques lépreux par le vaccin de Vaudremer. [**Treatment with the Vaccine of Vaudremer.**]—*Bull. Soc. Path. Exot.* 1937. Nov. 10. Vol. 30. No. 9. pp. 749–751.

This is a brief report on the use of the vaccine of Vaudremer in eleven cases with unsatisfactory results. *L. R.*

TISSEUIL (J.) & GUILHAUMOU (F.). Essai de traitement de la lèpre nerveuse par le vaccin antirabique. [**Antirabic Vaccine in Nerve Leprosy.**]—*Bull. Soc. Path. Exot.* 1937. Nov. 10. Vol. 30. No. 9. pp. 751–755.

These authors report that they were induced by observing clear amelioration of a patient with leprosy while undergoing antirabic treatment, to use it in three nerve cases of leprosy. They observed temporary general improvement with softening of nodules and healing of ulcers, which they attribute to simple biotherapy. *L. R.*

REENSTIERNA (John). **A Fourth Orientation on the Therapeutic Value of an Anti-Leprosy Serum (in Colombia and Venezuela).**—*Acta Med. Scandinavica.* 1937. Supp. 85. 106 pp. With 1 text fig., 6 charts & 6 plates (3 coloured). [Refs. in footnotes.]

This is a further report on the trials of the author's serum in advanced ulcerated cases of leprosy during a visit to the South

American States of Colombia and Venezuela (see this *Bulletin*, 1934, Vol. 31, p. 263; 1936, Vol. 33, p. 614). The beneficial results he found to follow its use include diminution in the size of nodules, change in the colour of affected skin towards the normal, improvement in nasal symptoms, anaesthesia, nerve pains, paralysis, oedema and return of the temperature in febrile cases to normal. Slight febrile reaction follows its use, but the rise of temperature is not considered to be sufficient to account by itself for the improvement seen. Most of the patients received only three intragluteal injections of 10 cc. each in the course of a week, and the serum did not appear to be harmed by two months exposure to tropical heat. It is still too early to form an opinion regarding the effects of several years' treatment of cases, and the author does not expect it to bring about cures by itself; but its rapid and favourable action on leprous manifestations observed by more than 20 physicians in different countries, after the failure of chaulmoogra preparations, entitled him to assume that his serum ought to be a good auxiliary to the standard therapy with chaulmoogra, which is all he has claimed from the first. *L. R.*

WAYSON (N. E.). **Cutaneous Leprosy. Presumable Cure by Surgical Removal of a Lesion.**—*Arch. Dermat. & Syph.* 1937. Dec. Vol. 36. No. 6. pp. 1185–1186.

The patient was a French priest, aged 61, who had worked for eight years in the Kalaupapa leper settlement of Hawaii, and had been notoriously careless in cleansing his hands after contact with leper patients, and he habitually rubbed the tips of his fingers on the central portion of his forehead when reading. Three typical leprous nodules about 1 cm. in diameter developed at this site and contained acid-fast bacilli. They were removed several weeks after their appearance, and showed clumps of acid-fast bacteria. As four years have since elapsed without the appearance of any further manifestations it would appear that he may be cured.

Reference is made to a similar case of McCOY in a child operated on sixteen years ago, and the interesting information is added that this patient has also remained free from further symptoms. The author recognizes that it is too early in the case now reported to regard the cure as permanent. *L. R.*

TISSEUIL (J.). Heureuse action de la yohimbine sur la laryngite des lépreux. [**Yohimbine in Laryngeal Leprosy.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 634–635.

The author records four cases of laryngeal leprosy in which rapid relief to respiration and general improvement followed the oral administration of 2 to 4 granules of yohimbine daily for ten days.

L. R.

VAN BREUSEGHEM (R.). Essai de traitement de la lèpre par un colloide de synthèse associé au bleu de méthylène. [**Treatment of Leprosy with a Colloid Preparation of Methylene Blue.**]—*Internat. Jl. Leprosy.* Manila. 1937. Jan.–Mar. Vol. 5. No. 1. pp. 73–75.

SITANALA (J. B.). Melaatschheid. [**Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Sept. 14. Vol. 77. No. 37. pp. 2233–2246. With 3 figs. on 1 plate.

CHORINE (V.) & BERNY (P.). Infection génitale des rats avec le bacille de Stéfansky. [**Infection of Rats with Stéfansky's Bacillus by the Genital Route.**]—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept. Vol. 5. No. 3. pp. 309–310.

MARCHOUX and SORAL have reported the infection of a male rat in the prepuce by rat leprosy containing material. The present writers record the successful infection of female rats by placing infected material in the vagina, as well as positive results in males. No chancre at the site of infection was observed, but the mucous membrane was traversed by the organisms and general infection resulted. They suggest a similar possibility in the case of the human subject. *L. R.*

SATO (Masaru). Rattenlepra. II. Teil: Uebertragung auf Tiere. [**Rat Leprosy. II. Transference to Other Animals.**]—*Japanese Jl. Dermat. & Urol.* 1937. Sept. 20. Vol. 42. No. 3. pp. 149–163. With 34 figs.

This well illustrated article describes the lesions of rat and mouse leprosy. Further, the author found that no infection is produced in rabbits and guineapigs, but in the case of hens more or less distinct nodules, with a histological picture differing little from that of leprosy, can be induced by the inoculation of rat leprosy material. *L. R.*

GRALL (A.). Le blocage du système réticulo-endothélial dans la lèpre murine. [**Blockage of Reticulo-Endothelial System in Rat Leprosy.**]—*Bull. Soc. Path. Exot.* 1937. Oct. 13. Vol. 30. No. 8. pp. 636–643.

Intravenous injections of carmine, Chinese ink and animal charcoal respectively were given very shortly before intravenous injections of fine emulsions of rat leprosy bacillus infection to determine the effect of blocking of the reticulo-endothelial tissues on the evolution of the disease. The difference between the degree of infection in the blocked and in the control animals proved to be very slight as regards the common infection of the liver and spleen thus induced. *L. R.*

MARCHOUX (E.), CHORINE (V.) & KOECHLIN (D.). Le bacille de la lèpre et le système nerveux. [**Stéfansky's Bacillus and the Nervous System.**]—*Ann. Inst. Pasteur.* 1937. Dec. Vol. 59. No. 6. pp. 549–576. With 15 figs.

Rats may survive the injection of the bacillus of Stéfansky into the cerebral membranes and even into the brain itself in some cases. The cerebral membranes, especially the dura mater, rapidly become affected and it may extend into the ventricular membranes, and also always affects those of the optic nerves. Infection of the eye may also extend to the cerebral membranes. Lepromes may develop in the nervous substance of the brain, with involvement of the vascular endothelium and perivascular tissues. If the bacilli gain access to the sciatic nerve the adjacent lymphatics are much affected. Symptoms of meningeal irritation may be observed. *L. R.*

LOWE (John). Rat Leprosy. A Critical Review of the Literature.—*Internat. Jl. Leprosy.* Manila. 1937. July–Sept.; Oct.–Dec. Vol. 5. Nos. 3 & 4. pp. 311–328; 463–482. With 6 figs. on 2 plates. [141 refs.]

LOOTS (J. H.). Leprosy.—*Proc. Transvaal Mine Med. Officers' Assoc.* 1937. Aug. Vol. 17. No. 188. pp. 23–30. With 8 figs.

LAMPE (P. H. J.). Beschouwing over de verspreiding van lepra en opmerkingen over lepra-prophylaxe. [**The Spread and Prevention of Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1937. Nov. 2. Vol. 77. No. 44. pp. 2651–2687. With 6 figs. [60 refs.]

CHOLERA.

CALCUTTA: ANNUAL REPORT OF THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, 1936 [STEWART (A. D.), Director]. —[**Cholera** pp. 13–21] [RAJA (K. C. K. E.)].

As this section of the annual report shows, a number of important questions relating to cholera formed the subject of statistical research. These had reference to (1) Origin of epidemics, (2) spread of infection, (3) serological reactions of vibrios from cases of cholera, (4) chemical constitution of vibrios isolated from cases of cholera, (5) persistence of infection, and (6) changes undergone by the vibrios. This subject of the spontaneous variability of the cholera vibrio, by which it becomes changed into another strain receives its exemplification as follows: "In many instances the serological reactions of vibrios isolated from secondary cases or from persons in contact with cases did not correspond with those of the primary cases. In regard to the former there can be little doubt that their source of infection must have been the primary cases." *W. F. Harvey.*

MILLAR (G. M.) & MOHI-UD-DIN (Ghulam). **Cholera in Kashmir in 1935 with Special Reference to Certain Aspects of the Value of Protective Inoculation.**—*Indian Med. Gaz.* 1937. July. Vol. 72. No. 7. p. 402.

A severe epidemic of cholera broke out in Kashmir in 1935 with a record of 9,304 cases and 4,449 deaths. The total number of persons inoculated was 1,306,273. Owing mainly to shortage of vaccine 0·5 cc. single doses had to some extent to be used in place of 1 cc. doses. As the figures relating to certain districts were statistically fairly accurate, it is interesting to compare the percentages of cholera attacks for dose received. The numbers involved were 130,713, 15,823 and 21,871 with doses of vaccine of 0·5 cc., 1 cc. and nil respectively. The percentage incidence of cholera in these categories was 0·49, 0·29 and 11·35, which is in favour of vaccination over non-vaccination and of the dose of 1 cc. over 0·5 cc. *W. F. H.*

PARTHASARATHY (P.) & SUNDARARAJAN (E. R.). **Periodicity of Cholera in Mysore State. Part I.**—*Mysore State Dept. of Health, Bull. No. 12.* 1937. 23 pp. With 11 charts & 3 maps.

A long period of registered deaths from cholera, 1887–1934, has by analysis according to the periodogram method revealed a periodicity of occurrence every six years. This is only a preliminary study, but the forecast made on July 6th, 1936, "that cholera might occur in epidemic form in its season in 1936–37" appears to be confirmed. If forecasts can be made of epidemic probability, routes of spread charted, and the existence of endemic foci established, it is obvious that preventive and curative measures can be organized with a minimum of expenditure and absence of wasted effort. *W. F. H.*

LE ROUZIC. Considérations sur les épidémies de choléra ayant sévi en 1934, 1935 et 1936 sur le territoire de Karikal. [**Cholera during 1934, 1935 and 1936 in the District of Karikal.**]—*Ann. de Méd. et de Pharm. Colon.* 1937. Apr.–May–June. Vol. 35. No. 2. pp. 495–504.

Karikal is on the Coromandel coast in the Cauvery delta. The author regards British India as the source of infection, because

cholera is endemic there. It is easy to trace the incoming of the first cases into French territory, where the disease is apt to take on epidemic form. The present communication relates to 869 cases of cholera which have occurred since 1934 with 463 deaths. Mortality among treated cases was 43·6 per cent. More than one method of treatment was adopted, but the data obtained appeared to show that those persons receiving all types of treatment simultaneously—hypertonic serum, camphorated oil, adrenalin and bacteriophage had the greatest chance of recovery. *W. F. H.*

PUBLIC HEALTH REPORTS. 1937. Sept. 24. Vol. 52. No. 39. p. 1341. —**Cholera in China.**

Several important points of epidemiology and preventive medicine are treated by implication in this one-page reference to cholera in China. The war in China renders the prevalence of cholera in cities and seaports a serious danger, not only as the concern of military authorities but also of quarantine officers at ports receiving shipping from China. One of the territories thus affected is the " Philippine Islands and orders have been issued to carry out very careful inspection of ships, passengers and crew from infected or suspected ports including bacteriological examination to detect carriers." The probability of direct case infection of west coast seaports of the United States is remote with a disease whose incubation period is only 5 days although the possibility of carrier introduction has still to be dealt with. Air travel to San Francisco comes within the same category, except for passengers disembarking at intermediate places, who will have to complete the incubation period before being released from quarantine restrictions. A significant sentence concludes the article : " Because protected water supplies and protective milk supplies are the rule instead of the exception in American cities to-day, cholera is no longer the menace to this country that it was during the last century." *W. F. H.*

SASAKI (K.). Betrachtungen ueber Pseudocholera infantum in der Gegend von Taichiu. [**Pseudocholera Infantum in Taichiu.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1937. Oct. Vol. 36. No. 10 (391). [In Japanese pp. 2263–2271. With 4 charts. [11 refs.] German summary p. 2271.]

Pseudocholera of infants, or infantile diarrhoea, is a special acute nutritional disturbance in suckling children of 8 to 12 months of age. It is markedly seasonal in its occurrence and confined, in the neighbourhood of Taichiu, almost exclusively to the months from November to February. The symptoms are vomiting and the passage of milky-white stools. Prognosis is good both as regards life and restoration to health. *W. F. H.*

TAYLOR (J.). Recherches récentes sur le choléra dans l'Inde. [**Recent Researches on Cholera in India.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Sept. Vol. 29. No. 9. pp. 1843–1854.

I.—Characters of the Vibrios.

(a) *Serological.*—All strains have been tested for agglutination by an " O " serum containing agglutinin to *V. cholerae* group I (GARDNER and VENKATRAMAN) and by a serum containing H and O agglutinin. Of 462 strains from (1) cases of clinical cholera, (2) carriers, (3) water,

93 agglutinated with cholera group I "O" serum (Inaba) and 119 agglutinated with H + O serum only. Of 72 carrier vibrios none has agglutinated with O serum but many with H serum.

A desiccated standard O antigen of Inaba and Ogawa types has been prepared, from which O sera can be obtained. In India O sera have been prepared from vibrios of other serological types by the use of heated suspensions of those type vibrios. These investigations have shown that it is desirable to determine O agglutination either by the use of heated suspensions or by the use of a pure O serum. The questions have arisen (see this *Bulletin*, 1937, Vol. 34, pp. 783, 786 and *Bulletin of Hygiene*, 1937, Vol. 12, pp. 677, 678): (1) Whether different serological types are met with in true cholera and how they are to be differentiated; (2) What is the corresponding clinical character of these types and their epidemiological rôle. The important result has emerged that: "There have not been isolated vibrios of any other serological type than the classical *V. cholerae* from any series of clinical cases of cholera which have been chronologically or geographically connected." The classical *V. cholerae* is the "O" No. 1 of GARDNER and VENKATRAMAN. In India, however, experience has shown that in clinical cholera a considerable number of cases will furnish vibrios not agglutinated by high titre cholera serum or even no vibrios at all. This may be due to (1) the diarrhoea not being true cholera, (2) failure to isolate *V. cholerae* with the technique employed, (3) the non-agglutinable vibrio isolated being the causal agent. As regards this third point it may be stated that isolation of vibrios belonging to other than the classical type has not been observed where groups of cholera cases occur and that the vibrios isolated are of very diverse serological and biochemical types. These facts are considered to be evidence against their causal activity. If, however, they *are* causally related to choleriform diarrhoea, it is improbable that this has anything to do with epidemic cholera. Rough strains of *V. cholerae* have been isolated with the help of "rough" Inaba serum and have shown tendency to return to the smooth form. This tendency to reversion of rough forms has been also exhibited by those obtained through treatment with bacteriophage. "Completely" rough forms have, however, been obtained and are stable. As regards derivatives from a recently isolated smooth cholera colony the only admixture regarded as possible is of rough *V. cholerae* elements. The only vibrios therefore causally related to true cholera are the group "O" No. 1 (GARDNER and VENKATRAMAN) and rough derivatives of these with typical biochemical reactions.

(b) *Biochemical.*—See this *Bulletin*, 1937, Vol. 34, p. 785. Non-agglutinable strains are divisible into 2 groups: (1) Cholera red and Voges Proskauer positive, (2) Cholera red and Voges Proskauer negative. True cholera vibrios give a type I Heiberg reaction, cholera red positive, Voges Proskauer negative, and this combination of characters was given by no non-agglutinable vibrio of the 558 examined. El Tor vibrios gave a positive Voges Proskauer in 5 out of 6 strains. "No vibrio agglutinable or non-agglutinable, made rough by treatment with antiserum, has shown any change in its biochemical reactions.

II.—Bacteriophage in Prophylaxis and Treatment.

See this *Bulletin*, 1937, Vol. 34. pp. 428–429. The consultative committee set up to examine this question considers it very regrettable

that the trial instituted in Assam has not been conducted on a strictly controlled basis. As regards the results of treatment at the Campbell Hospital, Calcutta, it records the judgment that analysis of the figures shows no appreciable difference in the death rate of cases treated by bacteriophage and the control series, but that a certain value attaches to bacteriophage treatment added to ordinary methods of treatment when only the figures for cases in which agglutinable vibrios were isolated are taken into account.

III.—Preparation of Cholera Vaccine.

The view of the consultative committee is that the strains of vibrio used should (1) be smooth and translucent ; (2) form stable suspensions in normal salt solution ; (3) have the serological characters of group " O " No. 1 GARDNER and VENKATRAMAN, subtype Inaba and agglutinate to a significant titre with serum prepared from the desiccated Inaba " O " antigen provided by the standards laboratory of Oxford ; (4) ferment mannose and saccharose, but not arabinose ; (5) not be haemolytic ; (6) be isolated from cases of cholera during an epidemic ; (7) be highly stable even in subculture.

W. F. H.

GARDNER (A. D.) & WHITE (P. Bruce). Résumé des résultats obtenus dans l'Inde par l'emploi des sérums " O " agglutinant le vibrion cholérique préparés avec des antigènes " O " standard provisoires. [**Results obtained in India by the Use of " O " Sera Agglutinating the Cholera Vibrio prepared with Standard " O " Antigens.**]—*Bull. Office Internat. d'Hyg. Publique.* 1937. Sept. Vol. 29. No. 9. pp. 1855–1864.

I. Introduction [By A. D. GARDNER].—Much of this communication is commentary on reports from India. Conclusions arrived at are : The facts submitted fully confirm that the serum containing specific " O " agglutinins but no H agglutinins will separate a group of vibrios, which are without doubt causally related to epidemic cholera, from other vibrios whose pathogenic action is at least doubtful. This is a very important finding for the investigation of carriers. Again, all the specific vibrios give the type I Heiberg reaction, fermenting mannose and saccharose but not arabinose. The reaction is not specific to the cholera vibrios but is valuable as an adjuvant reaction. Inability to haemolyse the erythrocytes of the goat is, with one doubtful exception, an invariable character of the specific O vibrios described in these reports. Thus the El Tor question regarding agglutinable O vibrios, which are at the same time haemolytic, does not arise in this case. As haemolytic O vibrios are absent in those regions where bacteriophage has been distributed, it may be inferred that, even if it is possible for haemolytic power to appear in a laboratory strain under the action of bacteriophage, this will not lead to errors of diagnosis in the regions concerned. A bivalent or mixed O serum may be used for current diagnosis and a pure O serum reserved for scientific or epidemiological research.

II. Commentary on negative and doubtful results of bacteriological researches in clinical cholera [By P. Bruce WHITE].—In the case of original isolation cultures it is quite possible that the presence of

choleraphage may be capable of reducing not only the absolute numbers of *V. cholerae* present but also their numbers relatively to insensitive secondary invading vibrios. This will seriously interfere with the isolation of the primary organism or with its recognition in a form reacting to an O antiserum.

The variant cholera form is an important form and the situation as regards this type may be summarized as follows :—(1) Certain " variants " selected by the lytic action of the choleraphages B and M can show reduced agglutination to an O anticholera serum. When that agglutination is doubtful or partial, absorption tests should be applied. (2) The rough variant of the cholera vibrio emerging from the action of choleraphage A, and which is devoid of specific polysaccharide, is not agglutinable by a smooth O cholera serum. It is agglutinable by 0·85 per cent. salt and higher concentrations and should be studied serologically in a suspension of 0·4 per cent. salt. It must not be assumed because the rough form only has been isolated from a case of cholera that it is the pathogenic vibrio, or that the smooth form is not the real cause of cholera. The selective action of the A choleraphage must always be born in mind during isolation of the cholera vibrio. By the simple process of absorption of a cholera serum with a P race of the cholera vibrio (the most degraded form, without the rough polysaccharide), a serum can be obtained which is without action on smooth vibrios or heterologous rough races, but can agglutinate exclusively, or almost exclusively, the rough strains of the cholera vibrio and the El Tor vibrio. *W. F. H.*

Popesco-Combiesco (Cornélia) & Wisner (B.). Contribution à l'étude des vibrions cholériques et paracholériques. [**Study of the Cholera and Paracholera Vibrios.**]—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1937. June. Vol. 10. No. 2. pp. 111–143. With 2 figs. [26 refs.]

The original purpose of this study was to find an agglutinating serum which should be strictly specific and enable workers to identify rapidly and accurately the cholera vibrio. Such a purpose necessitated simultaneous study of the characters of the various types of cholera and paracholera vibrios. An excellent summary with conclusions is given of the work done to date, which is itself a continuation of much previous published work.

Summary and conclusions.—The authors have studied 110 strains of vibrio from a great many sources. (1) Morphologically they find it impossible to lay down absolute characters for the cholera vibrio. A single terminal cilium is not exclusive to cholera vibrios but the possession by a vibrio of several polar cilia serves to distinguish with certainty a vibrio deprived of fermentative power on glucosides from those which possess this property. (2) As regards biochemical characters there are three to be considered : indole formation, haemolytic action and the fermentation of sugars. Indole production is common to the vibrios of true cholera and to the vibrios of other affections, but again vibrios deprived of power to ferment sugars differ by being indologenic. Haemolytic action of a vibrio is very important. If a vibrio fails to haemolyse a suspension of goat erythrocytes and is agglutinated by specific serum it may be certainly taken to be a true cholera vibrio. Under the third heading of sugar fermentation much stress is laid on the method proposed by Heiberg.

Of the vibrios tested all those which serologically formed part of the group I " O " of GARDNER and VENKATRAMAN belonged equally and exclusively to Heiberg's group I. (3) Alteration of character by bacteriophage action is given in the statement :—" Apart from the modifications concerning their lysability (lysoresistance) and their haemolysing property (erythrocytes of rabbit and man) we have not been able to observe any other modification of initial characters . . . " (4) Several specific agglutinating sera were at the disposal of the authors. All vibrios derived from true cases of cholera, as well as those isolated in Irak from carriers, were agglutinated by all the sera. Of the 19 El Tor strains some few were agglutinated by some of the sera ; the remainder were not agglutinated. The agglutinations were performed at 37°C. and so H agglutinations were excluded. (5) Rabbit agglutinating sera were prepared to each of the El Tor vibrios. Crossed agglutination tests showed that this group was antigenically very heterogeneous. Some of the El Tor sera were even capable of agglutinating vibrios which had no fermentative action on sugars . . . (9) All the agglutinable vibrios, with only one exception, gave a positive Pfeiffer test *in vitro*. *W. F. H.*

BERNARD (P. Noël), GUILLERM (Jean) & GALLUT (Jean). Sur une diastase hémodigestive du vibrion cholérique. [**A Haemo-digestive Ferment of the Cholera Vibrio.**]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 25. pp. 180–182.

The ferment is one causing clearing of the blood agar on which the cholera vibrio is grown. This process is regarded as haemo-digestion. Isolation of the ferment was effected by extracting it from the medium of growth and not from the vibrio itself. In fact, the vibrio bodies do not contain it. The medium first used to provide the ferment, after the vibrio had been grown on it for 3 or 4 days, was solid : Peptone Chapoteaut 2 ; salt 0·5 ; well washed agar 3 ; water 100. It was found, however, to be easier to obtain the ferment from a nutrient bouillon after 8 days' culture. *W. F. H.*

BERNARD (P. Noël), GUILLERM (Jean) & GALLUT (Jean). Extraction et propriétés d'une diastase hémodigestive du vibrion cholérique.—*C. R. Soc. Biol.* 1937. Vol. 126. No. 26. pp. 303–305.

BERNARD (P. Noël), GUILLERM (Jean) & GALLUT (Jean). Action d'une protéidase du vibrion cholérique sur les matières protéiques dénaturées et naturelles. [**Cholera Protease.**]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 27. pp. 394–395.

The protease ferment obtained from a cholera culture (see above) when tested for its action on denatured protein such as coagulated horse serum, gelatin, peptone, milk, polypeptides, or on natural proteins such as egg white and fibrin, exerts a tryptic dissolving action on them extending to the production of tryptophane but not to indole. *W. F. H.*

BERNARD (P. Noël), GUILLERM (Jean) & GALLUT (Jean). Action d'une protéidase du vibrion cholérique sur ce même vibrion. [**Action of Cholera Protease on the Vibrio.**]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 28. pp. 478–480.

The protease (see above) isolated by the authors has been tried for its effect on the cholera vibrio under three conditions

and for a wide *p*H range. Their results are summarized as follows :—The digestive action of the cholera vibrio protease is : " (1) total on the proteins of vibrios heated at 100°C. in acid, neutral and alkaline medium with a maximum action in neutral medium ; (2) total on the proteins of vibrios heated at 56°C. in a feebly alkaline medium ; (3) partial on the proteins of living vibrios with individual variations according to the strain, in feebly acid medium." *W. F. H.*

BERNARD (P. Noël), GUILLERM (Jean) & GALLUT (Jean). Action d'une protéidase du vibrion cholérique sur les hématies. [**Action of Proteidase of the Cholera Vibrio on Erythrocytes.**]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 29. pp. 568–570.

Experiments are described of the action of the cholera proteidase, isolated by the authors, (1) upon sheep erythrocytes in suspension, and (2) incorporated in nutrient agar. The red colour of the sheep blood is transformed to a yellow-green, indicating the reducing action of the diastase, which has transformed the haemoglobin to haematin. The proteidase has digested the protein of the erythrocyte without attacking or hydrolysing the other constituents. The conclusion is drawn from the experiments that the cholera proteidase " does not possess haemolytic power. It brings about, in successive stages, the phenomenon of haemodigestion as described by VAN LOGHEM."

W. F. H.

MARRAS (F. M.). Studio comparativo fra i caratteri batteriologici del vibrione di El Tor isolato durante il pellegrinaggio del 1936 e i caratteri batteriologici del vibrione del colera. [**Vibrio El Tor and** *Vibrio cholerae.*]—*Ann. di Med. Nav. e colon.* 1937. Sept.–Oct. 43rd Year. Vol. 1. No. 9–10. pp. 407–414.

As a result of 6,124 examinations at El Tor during the pilgrimage of 1936, there were isolated six vibrios which agglutinated with 2 sera in dilution of 1–1,000 to 1–1,600. These two sera were " O " and " O+H" cholera sera. All six vibrios were indole positive, strongly haemolytic to sheep erythrocytes and had been obtained from healthy individuals or from individuals who had come to hospital for an ordinary malady. Five of those vibrios formed the subject of investigation ; the sixth was rejected because it was autoagglutinable.

The author concludes that none of the serological tests suffices to distinguish the cholera vibrio from the El Tor vibrio. In both of them the O and H agglutinins are the same. Apart from the haemolytic character of the El Tor vibrio the two types are differentiated because the El Tor organism does not produce the symptoms of cholera and is not possessed of the epidemiological characters of the cholera vibrio.

W. F. H.

LINTON (R. W.). **Report of the Cholera Carrier and Structural Enquiry.**—*Ann. Rep. All-India Inst. of Hyg. & Public Health, Calcutta, 1936.* pp. 41–44.

In this report a useful summary and survey of the cholera vibrio question from the point of view of chemical architecture is presented. Variability of vibrios, investigated by the single-cell technique, has

shown that an organism possessed of a given protein and polysaccharide can be transformed into one having " a protein and polysaccharide of entirely different type." The resulting organisms are given the rank of " strains " or " variants " and, as is pointed out, " the original strain becomes two strains each having distinct chemical structure. At the same time the serological, biochemical and metabolic characteristics of the variant differ from those of the original and resemble those of the new group into which the variant now falls." Metabolism technique has been applied to over 300 vibrio strains. The association of metabolic activity with chemical groups appears to be reasonably constant and it changes in parallel with any change of chemical structure in the course of variation. The groupings are set out as :—(1) Chemical groups I, II and VI from cholera cases and contacts, with protein I and a high metabolism. (2) Chemical groups IV and V from carriers both in India and El Tor with protein II and intermediate metabolism. (3) Chemical group III from water vibrios with protein II, a low metabolism and a different polysaccharide from groups IV and V. If it can be shown that variations such as these can occur, not only in the laboratory but also in the field, an answer should be found to the " vexed question of whether cholera cases arise only from previous cases and from contacts with these cases or whether the chronic carriers of groups IV and V can on occasion start epidemics."

W. F. H.

ABE (S.). **On the Growth of Intestinal Pathogenic Organisms, especially of Cholera and Cholera-like Vibrios in Culture Media containing Decoction of Mulberry Leaves.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1937. July. Vol. 36. No. 7 (388). [In Japanese pp. 1478–1496. With 1 coloured plate. English summary p. 1496.]

In a fluid culture medium prepared by the addition of peptone and salt to a decoction of mulberry leaves it was found that cholera and cholera-like vibrios " grew with the production of acid, while dysentery and salmonella groups of bacilli did not." The mulberry leaves contain saccharose which is fermented with the formation of acid and this fermentation accounts for the difference in behaviour of the two groups of organisms. *W. F. H.*

MACNEAL (Ward J.), FRISBEE (Frances C.) & KRUMWIEDE (Elma). **The Lysis of Vibrio Comma by Bacteriophage and by Immune Serum.**—*Jl. Infect. Dis.* 1937. Sept.–Oct. Vol. 61. No. 2. pp. 222–227. With 10 figs. (8 coloured on 1 plate).

An attempt is made to find morphological elements in the bacterial cells undergoing bacteriophage lysis which are not recognizable in the same cells undergoing immune serum lysis. As a basis of this research there is the proposed simple definition of a bacteriophage as " a minute particulate living being capable of growing and multiplying within a larger living cell, capable also of producing soluble enzymes which may act upon the bacterial structure and may diffuse in solution through the medium." The technique employed in the contrasted systems was :—to examine microscopically after staining (1) centrifuged sediment of vibrios incubated for 4 hours with cholera immune serum and human complement, (2) centrifuged sediment of vibrios incubated

for 3½ hours with bacteriophage. An excellent coloured plate shows the different appearances in the two cases. In the summary of the paper we read :—" the phenomenon of lysis of Vibrio comma due to bacteriophage action and that due to action of immune serum are similar as regards the macroscopic picture . . . The similarity in lysis . . . ceases here. It has been repeatedly shown that lysis due to bacteriophage may be transmitted in series, while lysis due to immune serum may not. Microscopic study of the centrifugalized sediments reveals characteristic differences also. There is a very marked variation in size and form of the vibrios grown with the bacteriophage beginning at 2½ hours and reaching its maximum at 3½ hours. Immune serum causes no appreciable enlargement of the vibrios up to 4 hours. The intracellular granules which retain the blue of the Castenada stain are abundant in the cholera vibrios altered by bacteriophage, but analogous granules cannot be recognized in the vibrios exposed to lytic serum nor in the control preparations. The possibility that these granules represent the particles endowed with the property of reproduction and with the property of secreting the lytic enzymes of the bacteriophage principal is worthy of consideration." *W. F. H.*

DEFICIENCY DISEASES.

LAL (R. B.); ROY (S. C.); GHOSAL (S. C.). **Investigations into the Epidemiology of Epidemic Dropsy. Part I. Introductory Notes and a Historical Survey** [LAL & ROY]. *Indian Jl. Med. Res.* 1937. July. Vol. 25. No. 1. pp. 163–176. [68 refs.] **Part II. A Summary of Field Studies** [LAL & ROY].—*Ibid.* pp. 177–213. With 2 maps. **Part III. Some Laboratory Studies on Rice as the Aetiological Agent** [LAL, ROY & GHOSAL].—*Ibid.* pp. 215–232. **Part IV. Experiments to test the Validity of Infection Theory in a Semi-isolated Community** [LAL & ROY].—*Ibid.* pp. 233–238. With 2 diagrams. **Part V. Feeding Experiments on Human Volunteers** [LAL & ROY].—*Ibid.* pp. 239–259. With 1 plate.

A review of the literature shows epidemic dropsy as one of the major medical problems in the three eastern provinces of India and particularly in Bengal. Three main theories of aetiology have been proposed: (*a*) it is caused by a toxic factor present in diseased rice; (*b*) a toxic substance in some samples of mustard oil is responsible; (*c*) the disease is a contagious infection. The first of these theories claimed most support, but for none of them was completely convincing evidence available. A fairly extensive investigation into the circumstances of an epidemic in Bihar during 1935–36 gave data that failed to support the rice theory or that of contagious infection. The observed facts could best be explained on the hypothesis that epidemic dropsy is due to a deleterious substance present in certain supplies of mustard oil.

In the third part of the report it is shown that an inefficient technique was responsible for the previous recording of opacity in rice grains as resulting from infection with *B. vulgatus*. It is further noted that rice that appears to be equally opaque is consumed in parts of India where epidemic dropsy does not occur. A small outbreak amongst the warders of a jail was closely studied and an endeavour was made to facilitate any contagious infection. No evidence in support of the contagious theory was obtained, but it cannot be said that infection was ruled out as a cause. Three experiments on a small number of human volunteers were designed to test the effect of suspected samples of mustard oil. The first experiment gave no positive results. In the second experiment two subjects out of six developed signs and symptoms strongly suggestive of epidemic dropsy; the interpretation is however not entirely simple since these two had also received so-called "diseased" rice. In the third experiment all the rice was healthy; all six persons given the suspected brand of mustard oil developed well marked characteristics of epidemic dropsy while none of the control group were affected. No evidence of adulteration was obtained by chemical examination of the sample of the oil used. Apart from the fact that the harmful substance withstands the high temperature of cooking and that it is presumably of chemical nature no evidence of its origin or nature is at present available.

H. N. H. Green.

CHOPRA (R. N.), DAS (N. N.) & MUKHERJEE (S. N.). **Studies on the Aetiology of Epidemic Dropsy. Effect of Plasma on Tissue Culture and Chorio-allantoic Membranes of the Chick.**—*Indian Jl. Med. Res.* 1937. July. Vol. 25. No. 1. pp. 261–266. With 6 figs. on 1 plate.

Plasma from acute cases of epidemic dropsy showed some toxic action on heart tissue cultures, with gradual inhibition of movement and cessation in 72–90 hours. The explants grew less rapidly and growth ceased in 7 days. In the controls movement continued up to the 14th day and the tissue survived to the 17th day. The inhibition of tissue growth was associated with fatty degeneration in the cells and the appearance of cytoplasmic granules after vital staining. Inhibition of movement occurred in 90 per cent. of the cases studied whilst cytoplasmic changes were only present in 25 per cent. These changes occurred in new explants up to the 5th passage in some cases, with inhibition of movement and growth and the presence of cytoplasmic granules. No toxic effect was observed on embryonic liver and spleen tissue. Two or three white macroscopic patches were seen in about one-fifth of the cases when the chorio-allantoic membrane was treated with plasma. This effect was again transmissible up to the 4th or 5th passage. These patches were similar to those produced by the virus of *laryngo-tracheitis* in birds but were smaller and fewer in number. The presence of a toxic agent in the plasma of active cases of epidemic dropsy is therefore considered established but its nature, virus, or otherwise, is not yet established.

H. N. H. Green.

ENESCU (M.) & RADENSCHI (A.). Contribuţiuni la studiul alimentaţiei ţăranului moldovean, cu observaţiuni asupra regimului pelagroşilor. [**Pellagra and the Food of the Moldavian Peasant.**]—*Rev. Igienă Socială.* Bucharest. 1937. Sept. Vol. 7. No. 9. pp. 449–472. French summary.

The authors made an exhaustive day-to-day study for the space of twelve months of the food ingested by four Moldavian peasant families numbering 6, 10, 11, and 6 persons respectively, and calculated the calorie value for each of them of protein, fat and carbohydrate; at the same time notes were made of the work done by the individual and his health.

The chief article of diet is "mămăliga" made from maize flour consumed in quantities from 1½ to 3 kilograms a day, to the total exclusion of bread. Beans take second place and were eaten on 133 to 220 days in the year followed by potatoes, onions, cabbage, carrots, etc., and a large amount of nettles. The average milk consumption was about 59 litres per person per annum. Meat in the form of pork and chickens varied between 30 and 78 kgm. per family. Eggs and fat only played a small part in the dietary, the same being true of imported foods like rice and olives. Fruits are taken chiefly cooked except the dried plums.

In family No. 1 were two pellagrins aged 57 and 78 years respectively.

Other articles will be published later. *H. S. Stannus.*

SLATINEANU (Al.), BALTEANU (I.) POTOP (I.) & FRANCHE (M.). Sur la teneur en phosphore, en calcium et en potassium dans le sang des pellagreux. [**The Phosphorus, Calcium, and Potassium Content of the Blood of Pellagrins.**]—*C. R. Soc. Biol.* 1937. Vol. 126. No. 31. pp. 811–813.

Twenty-one cases of pellagra were investigated; they showed either the erythema alone or erythema *plus* gastro-intestinal troubles or gastro-intestinal and mental symptoms. The results were as follows: Alkali reserve varied between 46·2 and 70. In cases with no diarrhoea there was an increase in values of total calcium and ultra-filtrable calcium (KOECHIG found lowered calcium in pellagrins with diarrhoea).

The acid-soluble phosphorus values (which are always higher than those of mineral phosphorus) showed wide variations, 20 to 6 mgm. per 1,000. On the average it was diminished. The ultrafiltrable phosphorus (mineral phosphorus) followed parallel to acid soluble phosphorus. The fraction which represents the difference between acid soluble phosphorus and mineral phosphorus is much reduced (50 per cent.). Potassium varies greatly, 348 to 145 mgm. per 1,000, but on the whole is diminished. *H. S. Stannus.*

LEUTSKY (C. M.). **Pellagra-like Lesions produced in Mice by Mineral Deficiencies.**—*Lancet.* 1937. Dec. 18. pp. 1421–1423. With 2 figs. [68 refs.]

After shortly referring to the many theories concerning pellagra and the contradictory opinions put forward in regard to the part played by vitamins, the author gives reasons for believing that the cause of pellagra lies "in an insufficiency of mineral components in food (cereals)." It had previously been noted that albino mice fed upon a basal polenta diet, to which 0·5 gm. of dried brewer's yeast was daily added, developed a scaly condition of skin of the anterior half of the body and tail, with necrosis of the ears and tail and loss of hair on the muzzle, around the eyes and later on the anterior half of the body with inflamed conjunctiva.

It was later found that albino mice fed upon a diet: casein 18; starch 68; oil 8; cod liver oil 2 and a salt mixture 1·1, the latter devised so as to correspond with the mineral content of maize, developed the same symptoms, followed by diarrhoea, sometimes with the passage of blood, and ending fatally.

The salt mixture was poor in sodium, calcium and chlorine, but contained an excess of acid radicals as compared to what is known to be necessary for normal development. From this experiment the author argues that: "The symmetry of the affected parts of the body is a proof that the signs developing in these mice are due to the influence of the nervous system" and that "whilst the nervous system is acted upon, it also acts itself on salt metabolism" and concludes that "the relationship of elements in our salt mixture affected the nervous and endocrine systems and was thus the principal cause of the illness. . . . These signs disappeared as soon as a normal salt mixture was given. Thus there is a reason to seek the cause of pellagra in an insufficiency of mineral components in food (cereals)."

H. S. Stannus.

ELLINGER (P.), HASSAN (A.) & TAHA (M. M.). **Therapeutic Trials on Pellagrins in Egypt.**—*Lancet.* 1937. Nov. 20. pp. 1188–1190. With 1 fig. [16 refs.]

Aware of the fact that pellagrins may improve when merely hospitalized but otherwise untreated, the authors sought to ascertain the effect of treatment by certain substances upon pellagrins when they remained in their ordinary surroundings, taking their usual diet and doing their usual work, in four villages in the central Nile delta.

The number of cases treated was, however, so small that results must be inconclusive. The results of treatment with egg-white and dried whey were for other reasons inconclusive, as also those following use of Fuller's earth adsorbate from autoclaved yeast extract, an eluate from this, and filtrate from the same plus lactoflavine. There remain the cases treated with yeast; these all responded to therapy, and 9 out of 10 are stated to have been "cured." Elsewhere the statement is made: "A complete and lasting cure could not be expected as the treatment did not remove the cause of the disease." [What symptoms the patients were suffering from and how so-called cure was evaluated are not mentioned.] *H. S. Stannus.*

SMITH (David T.), RUFFIN (Julian M.) & SMITH (Susan Gower). **Pellagra successfully treated with Nicotinic Acid: a Case Report.**—*Jl. Amer. Med. Assoc.* 1937. Dec. 18. Vol. 109. No. 25. pp. 2054–2055. With 2 figs.

LANCET. 1937. Dec. 18. p. 1467. **Nicotinic Acid and the Pellagra-Preventing ("P.P.") Vitamin.** (Report of an address by Dr. Leslie HARRIS.)

BRITISH MEDICAL JOURNAL. 1937. Dec. 18. p. 1243. **Vitamin B and Nicotinic Acid.** (Ditto).

Nicotinic acid was at one time supposed to be related to B_1 when FUNK and SUZUKI isolated this substance from active antineuritic concentrates, a supposition later disproved. Later EULER showed that nicotinic acid amide was a component of cozymase [with a formula nicotinic acid amide-ribose-O·(P:O)·O·(P:O)·O-ribose-adenine]. More recently nicotinic acid or its amide has been shown to have a growth-promoting action for certain bacteria and certain experimental animals (R. H. MUELLER and others). MUELLER isolated nicotinic acid from the liver. In 1937 C. A. ELVEHJEM *et alia*, W. J. DANN, L. H. MARGOLIS and others demonstrated the curative action of nicotinic acid or its amide in canine "black tongue," the condition originally suggested by GOLDBERGER as the equivalent of human pellagra. It was given in doses of 1·5 mgm. per kilo. body-weight and produced no ill effects when administered orally, intramuscularly or intravenously.

As is well known, the original so-called "vitamin B_2" has been shown to be a complex of several factors—lacto-flavin, the rat-dermatitis factor called B_6, and a third unknown antipellagra factor. It therefore now appears that nicotinic acid is closely related to the P.P. factor. Experiments on monkeys, in whom a disease analogous to pellagra can be produced, demonstrated its curative effect.

D. T. Smith and his colleagues now publish a case of pellagra successfully treated with nicotinic acid: A white male aged 42, agriculturist: He had suffered from recurrent symptoms of pellagra for 15 years. On admission to hospital in Durham, N. Carolina, he

presented glossitis, typical dermatitis of hands and feet, diarrhoea and a mild intermittent dementia ; the orifices of the sebaceous glands over the entire face were plugged with horny sebaceous concretions. Apart from a moderate degree of anaemia—R.C. 4,100,000 ; Hb. 87 per cent., absent abdominal and cremasteric reflexes and a low upright T wave in the electrocardiogram, there was nothing else to note. There was a history of a grossly deficient diet but no alcohol.

The patient was fed on a basic diet containing no natural P.P. factor. The sole treatment consisted in the administration of 60 mgm. nicotinic acid in sterile saline intramuscularly or the same dose in 1,000 cc. 5 per cent. dextrose in saline intravenously on alternate days to a total of 720 mgm. No untoward symptoms resulted, but flushing of the face, chest, neck and arms was noted a few minutes after the injections. Appetite improved in 24 hours, the mental confusion started to clear up in 48 hours, the skin after 3 days and was normal by the 12th day. On the 7th day the electrocardiogram was normal and on the 12th day the reflexes had reappeared.

Trials made in Egypt by Dr. HASSAN under the direction of Dr. Leslie Harris of the Cambridge Nutritional Laboratory were less dramatic. Nicotinic acid given by mouth up to a maximum level of ⅓ gm. daily to two asylum cases and three prison cases was found to hasten the subsidence of the erythema in all cases and little else.

Harris suggests that nicotinic acid was not the *sole* major deficiency in some pellagra-producing diets and that nicotinic acid may be only the precursor of a more active variation of the P.P. vitamin.

H. S. Stannus.

PETRI (Svend), WANSCHER (Oscar), TEGLBJAERG (Else) & TEGLBJAERG (H. P. Stubbe). Ueber die Behandlung der Pellagra mit Ventrikelpräparaten und die gastrogene Ätiologie des Leidens sowie seine Verwandtschaft mit Polyneuritis u. a. [**Treatment of Pellagra with Ventriculin.**]—*Acta Med. Scandinavica.* 1937. Vol. 93. No. 4–5. pp. 450–486. [4 pages of refs.]

This is a discussion of the aetiology of pellagra followed by a report on six cases of secondary pellagra in mental patients treated successfully with Ventriculin (Parke, Davis & Co.) in an Institution in Copenhagen. The authors are inclined to discard the theory of avitaminosis and they consider pathological changes in the gastro-intestinal tract as the real cause of pellagra. Cases of secondary pellagra after gastrectomy with a clinical picture identical with primary pellagra have been described in literature, and the authors agree with other workers that in these cases there is a lack of an intrinsic anti-pellagra factor which is normally present in the gastric mucous membrane. A similar condition would occur in cases of mesencephalic disease where hypothalamic centres regulating gastric function are affected. In these cases secondary pellagra seems to be quite common. In the reported cases treatment with vitamin B_2 preparations was unsuccessful while daily 30 gm. doses of Ventriculin cured the most pronounced cases within two months.

H. Lomas.

MEDICAL AND SANITARY REPORTS.

CEYLON (1936).

Ceylon, an island in the Indian Ocean, lying off the southerly extremity of India, has an area of 25,332 sq. miles, exclusive of the Jaffna lagoon, the area of which is 149 sq. miles. Colombo, on the west coast, is the capital. Its greatest length is 270 miles from north to south, and its greatest width is 140 miles. The total area is rather more than three-fourths that of Ireland.

Vital Statistics.—The more important facts may be set out as follows :—

Races and Communities	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Ceylonese ...	4,958,800	166,755	33·6	110,077	22·2	27,449	165
Europeans (including officials)	10,200	124	12·2	71	7·0	4	32
Indians ...	662,200	25,181	37·9	12,891	19·4	4,336	172
All races ...	5,631,200	192,060	34·1	123,039	21·8	31,789	166

The North-Central and Eastern Provinces showed the highest birth and death rates; the Western, and most populous of the nine Provinces, again had the lowest birth, death, and infant mortality rates. For urban (36 principal towns) and rural areas the following facts are supplied :—

Area	Estimated Population	Birth Rate	Death Rate	Rates per 1,000 live births	
				Maternal	Infant
Urban areas					
(*a*) Residents and non-residents	762,700	37·6	31·6	32·0	161
(*b*) Residents only	—	27·5	20·1	—	172
Rural areas	4,868,500	33·5	20·3	19·9	167

It is again noted (see this *Bulletin*, 1937, Supp., pp. 134*–135*) that in the rural areas registered causes of death cannot be regarded as dependable. In the 36 principal towns where the majority of deaths are medically certified, 24,127 deaths were registered; *infant deaths* accounted for 19·1 per cent. of the total, *pneumonia* for 12·8 per cent., *malaria* 8·8 per cent., and *pulmonary tuberculosis* 5·5 per cent. With regard to causes of death for the Island as a whole 11·8 per cent. of the total deaths appear under the title *pyrexia* (undefined).

The mean *Indian population on Estates* is given as 665,000, the birth-rate for these people 37·9, the death-rate 19·4 per 1,000 living, and the infant mortality rate 172 per 1,000 live births.

Maternity and Child Welfare Work.—This continues to receive popular support but demands cannot adequately be met for want of a sufficient number of public health nurses. Though for the Island as a whole maternal mortality rates show a slight increase over 1935 experience, in areas where intensive work on health unit lines is being done they show a decided reduction. *Puerperal sepsis* and *puerperal convulsions* accounted for 80·7 per cent. of the 4,158 deaths of women in childbirth. Of the 31,789 infant deaths recorded 35·6 per cent. were ascribed to convulsions and 21·3 per cent. to debility. Trained midwives provided by Government numbered 141, by local authorities 126, and by estates 121, making a total of 388 ; it is said that about an equal number are engaged in private practice. During the year legislation relating to the control and practice of midwifery in specific areas was enacted.

The training of midwives continued to be carried out at the institutions mentioned in these pages a year ago ; 158 women received training during the year under review. The period of training at the Lying-in Home has been increased to one year to be followed by six months of field work with a Health Unit. Also 9 nurses were selected and given training at the Kalutara Totamune Health Unit.

Among the *Indian population on Estates* the infant mortality rate was 172 with debility and convulsions the chief causes of death. The high rate is attributed to lack of skilled attention before, during, and after confinement ; it is said that few estates employ trained midwives (see above) and that maternity wards in Estate hospitals are not much used.

At the *Ante-natal Clinics* held at the *De Soysa Lying-in Home* 6,739 women made 9,902 visits, and at the post-natal clinics 374 mothers paid 477 visits. In addition 4,543 ante-natal and baby clinics were held at 77 centres where 17,393 visits were made by expectant mothers, 29,563 by infants, and 18,611 pre-school children were dealt with. Though the number of centres was fewer than in 1935, attendances were higher in all cases (see this *Bulletin*, 1937, Supp., p. 135*).

There are 48 voluntary associations in the Island actively associated with child welfare work with 27 local authorities contributing to the finances of these organizations. The four Lady Doctors continued their work chiefly among the Muslim population (see this *Bulletin*, 1937, Supp., p. 135*) : during the year they made 4,709 home visits, attended 203 mothers at childbirth, 1,235 sick expectant women, 1,897 sick infants and 6,778 sick pre-school children. They also held 830 clinics at 14 centres.

School Hygiene.—School health work continued to be carried out with the full available staff. During the year 2 Medical Officers and an additional trained school nurse were appointed, the total personnel engaged being 6 School Medical Officers, 27 Medical Officers, 21 District Medical Officers and 9 Nurses. The number of schools (excluding those unregistered or of special type) was 4,625, and the school population 673,523. The sanitation of schools received close attention, and the provision of adequate requirements more intensively pressed for. The total school population dealt with numbered 341,804 ; to 1,750 schools 7,597 visits were made, and 52,629 children were medically examined. Of the latter 38,483 or 70·5 per cent. showed defects of one kind or another, with an average of 1·9 defects per child. The principal findings recorded expressed as percentages of total defects

included, *defects of teeth and gums* (exclusive of *dental caries* 7·3) 17·6 per cent., *hookworm* 15·6, *malnutrition* 10·3, *anaemia* 7·3 and *pediculosis* 7·3 (the majority were girls).

Other activities included anti-malarial work with half-yearly examination of children, parasite and spleen surveys, administration of quinine, etc.; it is noted that during the course of a survey restricted to the examination of boys in selected schools throughout the Island, 161,201 were examined and 30·6 per cent. showed enlarged spleens. For hookworm 86,771 children were treated in 887 schools; 2,854 school-children received anti-smallpox vaccination, while 8,003 first and 6,969 second doses of T.A.B. were administered to school-children during the year.

Active interest continues to be maintained in *School Health Education* work. A special syllabus of lectures and demonstrations for the training of teachers in school health work was drafted. Increased progress is reported in the carrying out of routine health education procedures and instruction in schools. During the year 22 training classes (conducted by School Medical Officers and Medical Officers of Health) were held and 876 teachers trained.

Public Health, Sanitation, etc.—Dr. S. T. GUNASEKARA was appointed Director of Medical and Sanitary Services with effect from October 1936 in succession to Dr. R. BRIERCLIFFE, C.M.G., appointed Director of Medical Services, Nigeria (see this *Bulletin*, 1937, Supp., p. 145*). Steady progress is reported. Malaria control and health work on health unit lines received special attention; when these services are fully organized and functioning throughout the Island they should prove markedly effective in improving the health of the people. During the year several permanent anti-malarial works were constructed at various malaria campaign centres by the Division of Sanitary Engineering.

As regards *sewage disposal*, the control of soil pollution through the construction, maintenance, and use of sanitary latrines is the chief work of Sanitary Assistants. During the year 22 public and 17,901 private latrines were constructed; disposal of night-soil by trenching is carried out in 18 Urban District Council and 94 Sanitary Board towns. *Refuse* is disposed of by dumping, trenching, incineration, and composting. Further attention to the provision of proper drainage schemes is desirable for the elimination of potential and actual breeding places of anophelines; the Division of Sanitary Engineering carried out a number of improvements during the year.

The question of *water supplies* received the special consideration of the authorities, and every effort is being made to improve existing conditions; it is said that a large proportion of the population lacks an adequate and wholesome supply of drinking water. Soil surveys and borings were carried out by the Division of Sanitary Engineering with a view to the discovery of suitable well sites, and schemes and estimates drafted in connexion with new proposals for water supplies in various areas. Work accomplished during the year included (*a*) the construction of 119 new public wells and the improvement of 1,667; (*b*) construction of a new impounding reservoir; (*c*) adjustment and replacement of certain chlorinator installations; (*d*) preparation of designs, etc., for purification works (see also this *Bulletin*, 1937, Supp., p. 136*).

Food, etc.—In Sanitary Board and Urban District areas all food-handling trades are licensed yearly after inspection and recommendation by Medical Officers of Health. Drafts of legislative measures relating to the control of milk supplies, bakeries, aerated water factories, etc., are under consideration (see also this *Bulletin*, 1937, Supp., pp. 136*–137*).

Eleven Health Units (see this *Bulletin*, 1937, Supp., p. 137*) were in operation in the Island and functioned satisfactorily throughout the year; the additional personnel employed included 2 Medical Officers of Health, 27 Sanitary Inspectors, 6 Public Health Nurses and 36 Midwives. The work was concerned with community and individual hygiene, maternal and child welfare, health surveys and health education, school hygiene, general sanitation. At 63 maternity and child welfare centres 3,713 clinics were held and large numbers of expectant mothers, infants, and pre-school children dealt with. In connexion with these intensive health activities the following facts may be noted :—

Area Worked	Population	Birth Rate	Death Rate	I.M.R. per 1,000 births	Maternal Mortality per 1,000 births
1,245 sq. miles	820,166	29·1	15·3	121·8	12·1

The training of Sanitary Inspectors (now called Sanitary Assistants) was continued (see this *Bulletin*, 1937, Supp., p. 138*), and during the year out of a class of 40, 35 sat for, and 33 were successful at, the examination of the Royal Sanitary Institute. It is noted that 13 Field Medical Officers and 13 Public Health Nurses received special training during the year.

Sanitary conditions on Estates were reported by inspecting Officers to have been satisfactory; out of 459 estates visited only 9 were reported to have been in bad sanitary condition.

Port Health Work continues as previously described (see this *Bulletin*, 1937, Supp., p. 137*). Various new regulations under the Quarantine and Prevention of Diseases Ordinance 1897 were passed. During the year, 2,615 steamers and 147 sailing vessels entered the port of Colombo; 54 vessels arrived with cases of infectious diseases on board, eight cases were removed to hospital, the remainder being isolated on the ships concerned. Thirty-nine cases of human plague were recorded in Colombo and the usual steps were taken to prevent the infection reaching shipping in the harbour: regulations making compulsory the fumigation of cargoes from plague-infected ports were introduced. At 15 minor ports 550 steamers and 2,360 sailing vessels were dealt with.

Persons passing through the *Mandapam Quarantine Camp* numbered 86,855, and of these 72 passengers and 40 estate labourers were rejected on medical grounds; 34,148 labourers were treated for ankylostomiasis, and 34,753 passengers and 39,607 labourers were vaccinated. At the *Tataparai Quarantine Camp* 51,106 passengers were dealt with, 186 were rejected, and 52,820 were vaccinated.

Hospitals, Dispensaries, etc.—All parts of the Island are generously provided by the State with hospitals and dispensaries; as regards

hospitals, the following details relate to accommodation and work accomplished at these institutions during the year under review :—

Province	Number of Hospitals	Beds	Patients treated	Hospital Deaths
Western ...	24	5,408	96,981	6,996
Central ...	23	1,785	61,116	3,089
Southern ...	11	866	37,599	2,043
Northern ...	11	495	17,560	687
Eastern ...	6	404	8,286	452
N. Western ...	9	862	31,491	2,104
N. Central ...	3	200	8,368	514
Uva	12	700	22,839	968
Sabaragamuwa	13	996	40,015	1,997
Totals ...	112	11,716	324,255	18,850*

* In the Report total given as 18,990.

In addition to the above general hospitals the *Prison Hospitals*, with a total of 339 beds, dealt with 5,385 in-patients (26 died) and 72,731 out-patients. The *Lunatic Asylum* treated 3,731 patients with 201 deaths, and at the *House of Observation* (uncertified persons) 2,629 persons with 87 deaths. In the two *Leper Asylums* 1,115 patients received treatment and 70 died.

Government maintains 674 central and branch *dispensaries* and visiting stations, in addition to special institutions for the treatment of out-patients, *e.g.*, tuberculosis, eye diseases, etc. At dispensaries and out-patient departments 6,104,682 patients received treatment, the principal diseases being *malaria, gastro-intestinal diseases, respiratory affections.*

Private hospitals maintained on *Estates* numbered 85 and dispensaries 733.

The following facts relate to work carried out at selected institutions during the year :—

Hospitals, etc., in Colombo.

General Hospital.—In-patients 29,757, deaths 3,180, out-patients 103,644. *Out-patient Clinic, Diseases of Women,* 1,020 new patients. *X-Ray Dept.*, 10,137 patients examined. *Ear, Nose and Throat Dept.*, new out-patients 9,079. *Pathological Dept.*, examined and reported on 60,457 specimens.

Dental Institute.—26,513 new patients.

De-Soysa Lying-in-Home.—9,199 in-patients, 5,595 live births, 171 maternal deaths. Chief training school for midwives.

Victoria Memorial Eye Hospital.—In-patients 2,836, new out-patients 26,066, and 599 children dealt with at School Clinics.

Lady Havelock Hospital for Women and Lady Ridgeway Hospital for Children.—In-patients 4,401 (women 1,637, children 2,764) deaths 742 (67 women, 675 children). 54 pupils in the training school for nurses.

Female V.D. Hospital.—In-patients 498, one death, out-patients 30,156.

Infectious Diseases Hospital.—In-patients 3,066, deaths 163.

Outstation Hospitals.

Kandy Hospital.—Admissions 15,544. In the Nurses' Training school 51 pupils. *Eye Institute* 1,689 in-patients, 11,786 out-patients.

Galle Hospital.—In-patients 12,088, deaths 758. Midwives trained 12. *Eye Institute,* 11,340 cases.

With regard to *buildings and building requirements*, it is noted that a building programme for the next five years has been drawn up, and

five building schemes itemized. The first stage of the new Nurses' Home approaches completion; the rebuilding of certain hospitals and the remodelling of others are among matters under consideration.

The following notes briefly summarize the principal items of morbidity experience, etc., commented upon in the Report under review.

Malaria is still the most prevalent disease in the Island, but though in some districts incidence was still high, on the whole recovery from the disastrous epidemic of 1934–35 was satisfactory. The improvement is reflected in hospital returns where it is noted in-patients treated numbered 73,192 as compared with 161,313 in the preceding year, hospital deaths due to malaria 2,030 as compared with 5,340, and out-patients treated at hospitals and dispensaries 2,873,436 as against 5,293,468. In the whole Island malaria deaths numbered 7,620, while under the title *pyrexia* 14,520 deaths were recorded. The distribution of types of infection among in-patients was *benign tertian* 61,077, *quartan* 3,036, *subtertian* 301, *cerebral malaria* 900, and *cachexia* 7,690; there were also 188 cases of *blackwater fever* with 6 deaths. Anti-malarial measures continued to be energetically carried out along the lines adopted in previous years (see this *Bulletin*, 1935, Supp., p. 127*; 1936, Supp., p. 133*; and 1937, Supp., p. 140*).

Of *plague* 57 cases with 46 deaths were recorded; 45 of the cases were bubonic and 12 septicaemic. [The figures on page 14 of the Report are not in agreement with those presented in Table IX on page 26.] Thirty-nine of the cases with 33 deaths occurred in Colombo, and 14 with 9 deaths in two towns in the Central Province. Rat-flea surveys continued to be carried out; at Hatton in the Central Province *X. cheopis* formed 91 per cent. of the collection. Out of 759 rats examined at the Laboratory 61 were positive with *P. pestis*.

Cases of *cholera* numbered 49 and there were 44 deaths due to this cause; 48 of the cases and 43 of the deaths occurred in the Batticaloa District of the Eastern Province. An investigation started in 1931 (but discontinued in 1934) to discover the number of persons harbouring cholera vibrios was reopened during the year; vibrios isolated were sent to the Research Institute, Kasauli, for antigenic determination. Three fatal cases of *smallpox* were recorded; all occurred in Colombo among Tamils newly arrived from India. Primary vaccinations performed during the year totalled 145,108, of which 129,201 were successful.

Diphtheria appears to be on the increase and a study is being made of the incidence of the disease. During the year 103 cases with 13 deaths were reported to the Sanitary Branch, and 84 cases were treated in hospitals with 20 deaths. All cases were of the faucial variety, and 77 per cent. of them occurred in the Western Province. Deaths in the Island due to *influenza* numbered 1,583, there were 6,806 in-patient hospital cases, and out-patients treated for this cause totalled 177,699. *Measles* gave rise to 2,775 cases with 2 deaths, *mumps* 1,135 cases and 5 deaths, and *chickenpox* 6,768 cases with 12 deaths.

Enteric fever cases and deaths reported to the Sanitary branch of the Medical Department were 2,503 and 449 respectively, while hospital returns show that 3,048 in-patients were treated for the disease and 630 died. Of the hospital cases 2,320 were *Bact. typhosum* infections, 269 *Bact. paratyphosum* A, and 99 *Bact. paratyphosum* B. Records of cases and deaths are unreliable, for the majority of cases are said to escape notification (see this *Bulletin*, 1937, Supp., p. 141*). Of

dysentery 3,060 cases and 315 deaths were notified. Hospital in-patients numbered 5,179 and deaths 624. Among the hospital cases 3,333 were amoebic and 1,067 bacillary, but since the distinction was often made on clinical grounds little value attaches to these figures; it is noted that among cases subjected to complete laboratory investigation, the bacillary type predominated. Out-patients treated for the disease numbered 28,631.

For *tuberculosis* (all forms) 5,357 persons were treated as in-patients at the various hospitals, etc., and 1,177 died; no less than 4,449 of the total cases and 1,054 of the deaths were due to the *pulmonary* form of the disease, while deaths in the Island as a whole due to pulmonary tuberculosis numbered 3,167. At the four special institutions for tuberculosis (see this *Bulletin*, 1937, Supp., pp. 141*–142*), 1,769 in-patients and 3,640 out-patients were dealt with. It is noted that hospital cases of *pneumonia* numbered 10,014 and deaths due to this cause 4,069, and cases of *bronchitis* 6,906 with 323 deaths.

The incidence of *cancer* appears steadily to increase. During the year under review 1,636 cases were dealt with in hospitals and 168 hospital deaths were ascribed to this cause. Cancer deaths in the Island as a whole numbered 580. Of the hospital cases 742 were Sinhalese and 96 died, 271 were Tamils with 41 deaths, the remainder occurring among members of other races. Cancer of the buccal cavity and female genital organs again predominated (see this *Bulletin* 1937, Supp., p. 144*). Among other diseases responsible for hospital in-patient treatment *rheumatism* with 4,284 cases and *nephritis* with 3,106 cases were prominent.

Leprosy.—During the year 1,253 cases were treated at Government hospitals and the two Leper Asylums, and 74 patients died. The Leprosy Survey was completed in the Western, Southern, and Eastern Provinces; the total area surveyed during the year amounted to about 1,800 square miles with a population of nearly half a million. Six new treatment centres were opened and there are now 16 clinics established for the early diagnosis and treatment of the disease; at these centres 1,257 cases were under treatment or observation. It is stated that at the end of the year there were 2,207 known cases in the Island, of which 1,910 were Ceylonese.

The work of the two Leper Asylums is separately described at some length. At the *Hendala Leper Asylum* 154 patients were admitted, 883 treated, 62 discharged, and 56 died, while at the *Mantivu Leper Asylum*, 21 lepers were admitted, 232 were treated, 32 were discharged and 14 died. Treatment at these institutions followed along lines previously described (see this *Bulletin*, 1937, Supp., p. 142*).

Helminthic Diseases.—The Hookworm Campaign is reported to have made satisfactory progress during the year; six additional dispensers were appointed to the staff. Administrative organization and procedure of the campaign remained for all practical purposes unchanged: work continues to be described in great detail. During the year 1,855,572 treatments were given, those carried out by the various agencies being:—

At Government Institutions ...	1,223,850
At Outside Institutions	29,295
By Campaign Dispensers	424,522
Health Units	45,255
Mandapam Camp	34,148
Estate Medical Staffs	98,502

Cases treated as hospital in-patients numbered 14,693, and of these 621 died. There were also 2,654 cases of *ascariasis* with 217 hospital deaths, 103 cases of *filariasis* with 3 deaths, and 267 out-patient cases. At the Central Laboratory out of 18,013 faecal specimens examined 79 per cent. contained *hookworm*, 75 per cent. *trichuris*, and 72 per cent. *ascaris*.

Venereal Diseases.—In-patients treated at the various hospitals numbered 7,382, distributed as to 2,258 cases of *syphilis*, 4,856 of *gonococcal infections*, 5 of *granuloma venereum*, and 263 of *soft chancre*; these titles in the aggregate were the cause of 90 hospital deaths. Out-patients treated at hospitals and dispensaries totalled 28,072.

There are three special V.D. Clinics in Colombo and one in Kandy, and at these centres the following cases were dealt with :—

	Syphilis	Gonorrhoea	Other V.D.	Yaws
General Hospital, Colombo	1,289	1,531	99	10
Port Clinic for Seamen, Colombo	21	19	—	—
Female Branch Hospital, Colombo	227	367	369	—
Kandy Dispensary ...	97	122	42	8

Although only 18 cases of *yaws* appear to have been treated at the above four clinics 956 cases received treatment as hospital in-patients, and 10,666 as dispensary out-patients.

Scientific.—The 32,168 specimens received and examined at the *Bacteriological Institute* included 11,870 samples of blood serum; 2,112 of these reacted positively with the agglutinins of *Bact. typhosum*, 30 with *Bact. paratyphosum* A, and 48 with *Bact. paratyphosum* B. Wassermann tests numbered 7,850 with positive reaction in 1,348 cases; 436 out of 2,971 blood films examined were found to contain malaria parasites. Faecal specimens totalled 3,187, of which 216 contained *Bact. dysenteriae*, 375 the ova of intestinal parasites, and 10 *E. histolytica*. On the other hand it is noted that among 1,922 faecal specimens received for examination from four institutions, 176 contained *Bact. dysenteriae* and 96 *E. histolytica*.

The 79,687 doses of vaccines prepared and issued included 49,269 doses of T.A.B. vaccines, 17,672 doses of gonococcal vaccines, 7,779 doses of plague and 3,586 doses of cholera vaccines.

Laboratory work is also carried out at two institutions in Colombo, and at nine outstations; specimens dealt with at these centres may be tabulated as follows :—

	Specimens examined	Positives Malaria	Positives Hookworm
Victoria Memorial Eye Hospital, Colombo	7,432	13	19
Lying-in Home, Colombo	7,012	174	107
9 Outstation Laboratories	123,237	6,001	21,751

The investigation into the subject of diets and nutritional deficiencies of the local population, started four years ago, was completed (see this *Bulletin*, 1937, Supp., p. 144*). The results of the work were published in the *Ceylon Journal of Science*, Vol. 4, Part 1, April 1936.

The new building for the *Bacteriological Institute* should be completed in 1937.

At the *Pasteur Institute* 1,993 persons received preventive inoculation against rabies, 938 of them being dealt with as in-patients. Brains from dogs and other animals examined during the year numbered 583 of which 253 were positive with Negri bodies.

Division of Medical Entomology.—A comprehensive report describes in detail the work of this Division. Malaria research and control were the main preoccupations of the staff ; the work carried out at the 25 observation stations in the epidemic and 8 in the non-epidemic zone is described and results recorded. Upwards of 70 lectures and demonstrations, on Medical Entomology with special reference to Ceylon conditions, to Field Medical Officers, Sanitary Inspectors, etc., were given.

Scientific Papers published by members of the staff of the Department of Medical and Sanitary Services included the following :—

CHANMUGAN (P. K.). Note on an unusual ophthalmic artery associated with other abnormalities.—*Jour. Anat. Lond.* 1936. July. Vol. 70.

ELLISON (F. O. B.). Malaria epidemics and sunspot cycles.—*Trans. Roy. Soc. Trop. Med. Hyg.* Lond. Vol. 29. No. 6.

HILL (W. C. O.). Two examples of infantilism.—*Ceylon Jour. Sci.* (D). 1936. Aug. Vol. 4. Pt. 1.

NICHOLLS (Lucius). A nutritional survey of the poorer classes in Ceylon. —*Ibid.*

KARUNARATNE (W. A. E.). (i) Carbon Tetrachloride Cirrhosis in relation to Liver regeneration (with G. R. CAMERON).—*Jour. Path. Bact.* 1936 Vol. 42. No. 1 ; (ii) The Pathology of Rhinosporidiosis.—*Ibid.*

PAUL (M. A.) Surgical measures in Leprosy.—*Int. Jour. Leprosy.* 1936.

The following were published in the *Journal of the Ceylon Branch of the British Medical Association* :—

BLAZE (J. R.). Nervous Diseases in Ceylon.

FERNANDO (P. B.). A note on the rectal administration of quinine.

FERNANDO (S. E.). Notes on a case of Intraorbital Endothelioma.

GUNAWARDENA (H. C. P.). Tetanus.

JAYASURIYA (J. H. F.). A case of cerebral tumour.

KUNARATNAM (I. T.). Notes on a case of Volvulus complicating Pregnancy.

LEANAGE (D. T. J.). The incidence of Syphilis.

PAUL (Milroy). Neuro-fibromas of large nerves.

PONNAMBALAM (C.). Notes on eleven cases of poisoning with " Nachukai."

SENANAYAKE (I. A.). Balantidial Dysentery.

SINNATAMBY (G. S.). Treatment of enlarged prostate in the very aged.

WICKREMASINGHE (S. F.). Observations regarding the uses of Atebrin and Quinine in the treatment of malaria.

WIJERAMA (E. M.). Notes on two cases of interesting tropical diseases.

Medical Education.—References to the 1936 Report of the Registrar of the Ceylon Medical College make mention of staff changes and appointments, and to the students of various grades on the rolls of the College ; the relevant facts may be briefly summarized as follows :—

Results of Examinations.

Medical	Sat	Passed	Apothecaries	Sat	Passed	Mid-wives	Sat	Passed
Pre-medical ...	79	31	1st Apothecaries	25	15	Class I	41	32
1st Professional	78	46	2nd Apothecaries	53	24	Class II	117	101
2nd Professional	51	37	Pharmacists ...	25	15			
Final	53	26						

Concluding Observations, Recommendations, etc.—Dr. S. T. Gunasekara outlines the policy of rapid expansion of future health work throughout the Island, and emphasizes the importance of the training of necessary personnel if development on intensive lines is to be successfully undertaken; in his opinion the Diploma in Public Health should be a *sine qua non* for all Field Medical Officers, and facilities should be provided for such officers to obtain the qualification. The provision of adequate minor personnel is necessary to keep pace with developments envisaged. More radical measures for dealing with the plague problem in Colombo should be introduced; extensive rebuilding of properties in congested areas where plague is endemic and the establishment of an *Improvement Trust* are among the recommendations made. Further attention requires to be devoted to such matters as soil pollution, provision of protected water supplies, and the establishment of a training base in the field for malaria control work.

Once again mention is made of the overcrowding of hospitals; the recommendations outlined in the 1935 Report are repeated (see this *Bulletin*, 1937, Supp., p. 145*).

Financial.—Estimated expenditure on Medical and Sanitary Services for the year under review was Rs.10,681,422, while *actual expenditure* amounted to Rs.10,952,128. The latter sum, which represents 10·6 per cent. of the Revenue of the Island during the financial year, does not include the cost of new buildings or improvements to and maintenance of existing buildings.

P. Granville Edge.

Printed under the authority of His Majesty's Stationery Office
By the South Essex Recorders, Limited, High Road, Ilford.

(69) Wt. 11/202 1875 4/38 S.E.R. Ltd. Gp. 353.

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Enquiries to the Resident Secretary, Hospital for Tropical Diseases, 25, Gordon Street, London, W.C.1.

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